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SEP 4 1934

September 20, 1934

Engineering News-Record

Appraisal of TVA Progress

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Concrete Paving Methods in New Jersey

Pier Rebuilt by Relief Workers

Reconstruction of Large Trainshed In Chicago

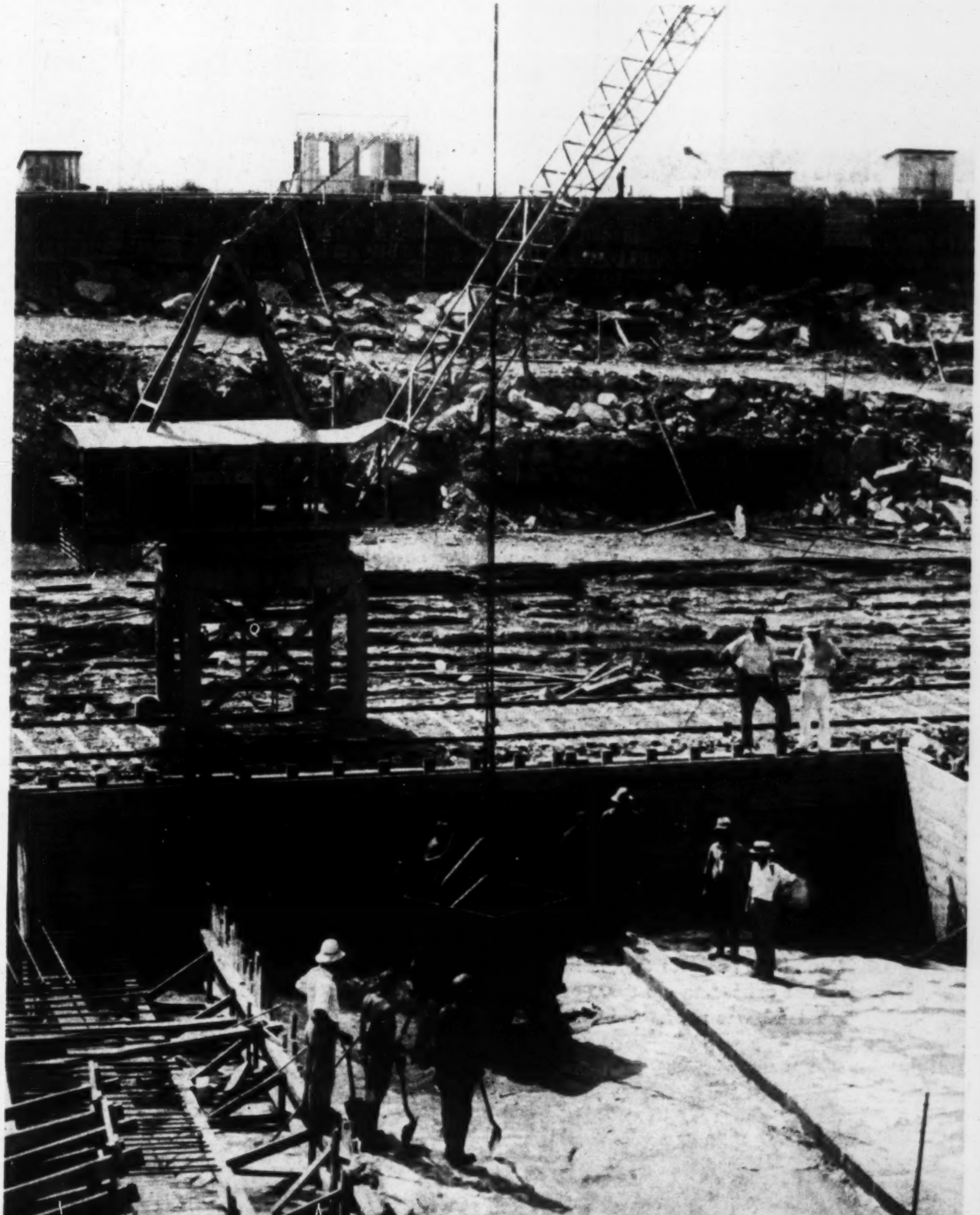
Potomac River Storage Planned

The Engineer's Obligation in Highway Safety

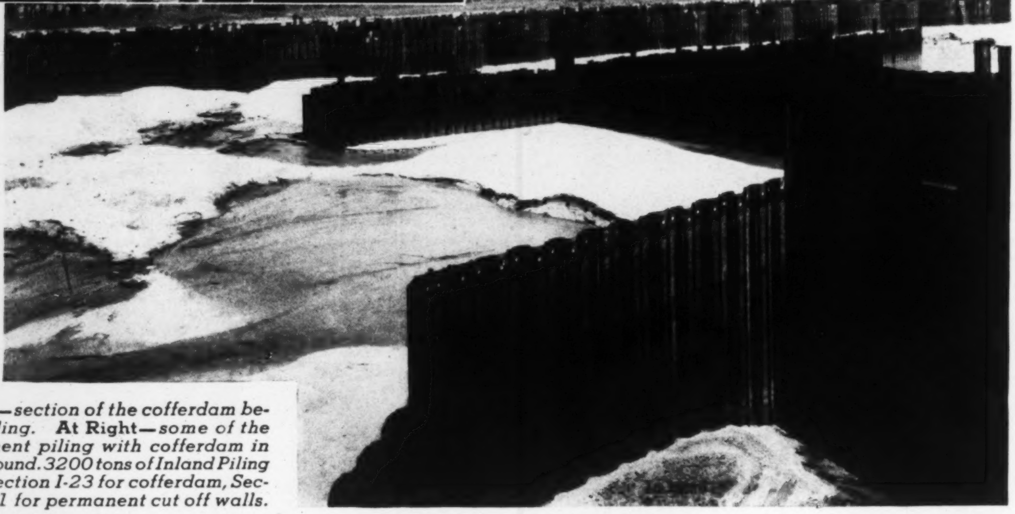
Management of Hauling In Construction

❖

ucket of concrete
to Wheeler Dam



Contractors Rely on Inland Piling for Mississippi Waterway



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At Top—*section of the cofferdam before filling.* **At Right**—*some of the permanent piling with cofferdam in background. 3200 tons of Inland Piling used: Section I-23 for cofferdam, Section I-31 for permanent cut off walls.*

● Pictured above are views of one of the many lock and dam jobs on the great Mississippi River 9-foot channel project on which leading contractors have used Inland Steel Sheet Piling.

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A MOMENT WITH THE PUBLISHERS

Business *Still is* Business

WE have an old saying to the effect that "business is business." Most of the time this truth is obvious but every now and then it becomes obscured. We are living through one of those times; business now seems in large measure to be politics.

All of which is unfortunate, even though it be understandable and excusable. If ever there was a time when business should be permitted to think of nothing but business it is now. During the last year many indexes have indicated improvement; many individual enterprises actually have felt an upturn. We have been making substantial progress on the long pull that will bring us closer to meeting the needs and the hopes of the people.

Then came the political witch-doctors, each brewing strong medicine to suit his political needs. Those that are "in" deplore what may happen to business unless they stay in; those that are "out" forecast calamity unless they get in. Incumbent statesmen sweat to prove that they are indeed the inspired architects of recovery, without whose ministrations the edifice surely must crumble; rejected and embittered statesmen call the ancient gods to witness that "wisdom died with them" and that without their leadership we must be hell bent.

The red prophets of the left shriek imprecations upon all that is and warn of its impending fall. The black priests of reaction beat their breasts, mourn the undermining of the "institutions that have made us great" and foretell the doom that must overwhelm us unless those institutions remain in their custody. The labor politicians see the country headed for the dogs unless they take it in charge; industrial spokesmen are equally insistent upon calamity if labor should increase its power. One "brain-trust" of professors assures us solemnly that unless we turn everything upside down we are undone; another "brain-trust," of equally academic hue, assures us with equal solemnity that if we so much as change our economic course by a hair's breadth we are undone.

It is an entertaining show but somehow it doesn't make sense. From it all one might infer that, whatever befall, we are undone. Fortunately, however, the wise business man knows better and refuses to be stampeded into a case of jitters.

The fact is, of course, that all this clamor is but political buncombe, designed to prey on the fears of the people. A minor fraction of it is sincere but the great bulk of it follows the time-honored procedure of the cancer-cure quack: "first make 'em think they have it." Its technique is invoked in behalf of party politics, class politics, newspaper politics, economic politics, financial politics and every other variety of politics. Each group seeks to terrify the populace into acceptance of its special recipe as the one true source of salvation.

This writer has no concern with such partisan politics. He recognizes that each citizen must make his own decision as to party preference, group interest and class loyalty. But he knows too that all the mouthings and the rhetoric of party politicians and group propagandists of every sort have no relation to business recovery except as they may befuddle the understanding and paralyze the initiative of the individual citizen.

When all these opportunist appeals to fear and prejudice are written off, the fact remains that we have had in this country four or five years of underconsumption, underproduction, underemployment and underprofit. Meanwhile we have drained off most of the poison that was injected into our system by the so-called prosperity of 1924-1929. We have survived the worst of the crisis without destructive social upheaval and now we are getting better. As never before our people need the goods and services we are so well qualified to produce; as never before our producers need the business thus made possible. The stage is all set for the enactment of recovery, although for the moment confidence, the leading character, may hesitate in the wings, bewildered by the clamor of the propagandists.

But the wise business man knows that this must soon subside and that creative industry again will take command in its own house. He knows that recovery is in progress and that nothing can stop it. And in his planning for the immediate future he never forgets that, despite the political froth on the surface, business at bottom still is business and that business progress will be made by those who consistently go after their business, unterrified by political alarms.

Willard Chevalier

ENGINEERING NEWS-RECORD

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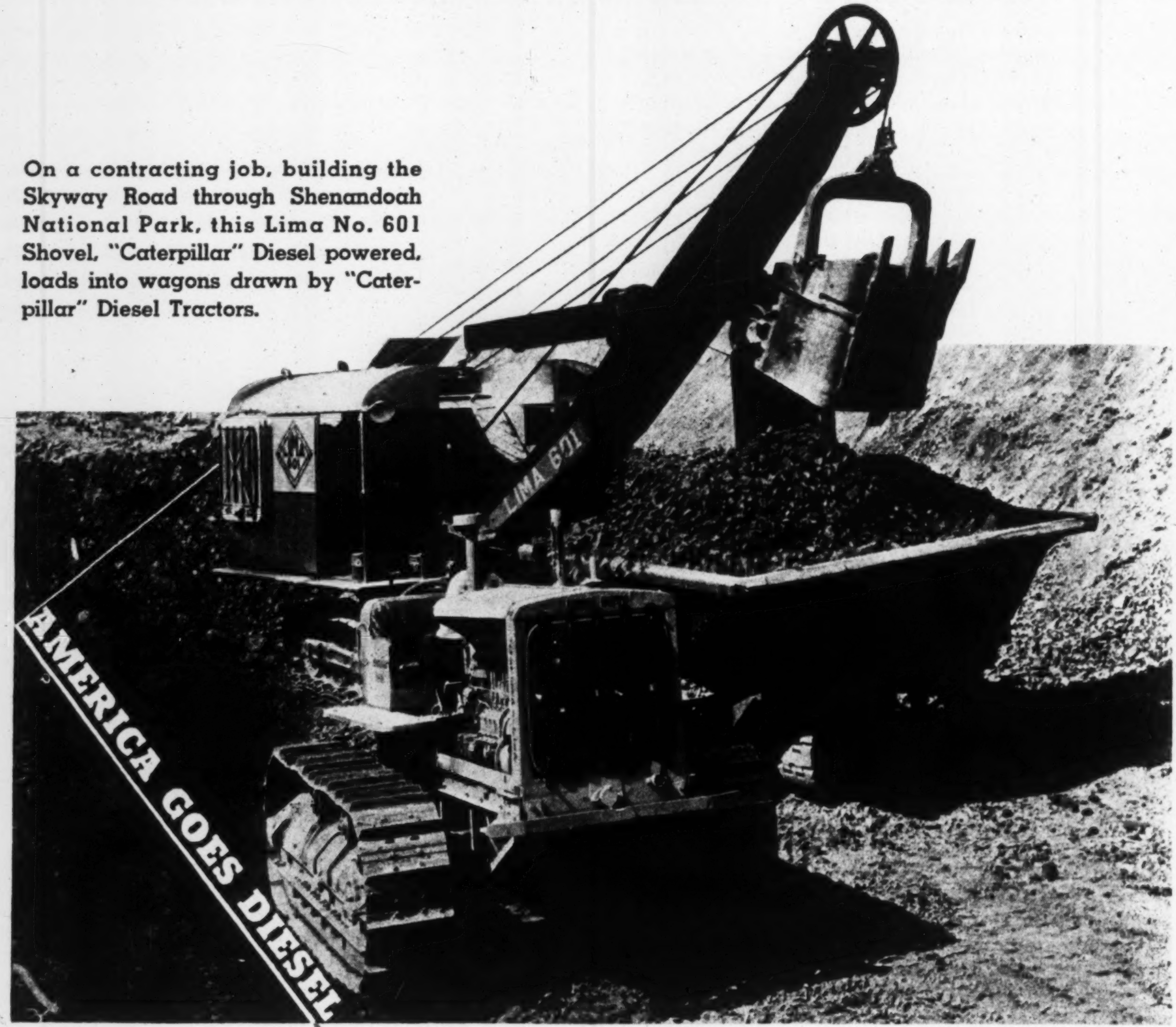
WITH "CATERPILLAR" DIESEL POWER

LIMA OFFERS INCREASED PRODUCTION, LOWER FUEL COSTS

On a contracting job, building the Skyway Road through Shenandoah National Park, this Lima No. 601 Shovel, "Caterpillar" Diesel powered, loads into wagons drawn by "Caterpillar" Diesel Tractors.



The application of "Caterpillar" Diesel power has given purchasers of Lima shovels, draglines and cranes a new conception of fuel economy. Fuel costs 60% to 80% lower than with gasoline-powered machines are reported—and greater yardage that results from the smooth lugging power, the dependability and the ease of operation and maintenance of the "Caterpillar" Diesel.

Like The Ohio Power Shovel Company, builders of Lima excavating machinery, many manufacturers are today going Diesel with "Caterpillar." Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

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In the News:

ONE YEAR after federal funds were made available for slum clearance in Cleveland, 75 parcels of lands passed into possession of the PWEHC through federal court action Sept. 7. Demolition of old buildings in the Cedar-Central area is scheduled to start in a few weeks.

THE NATIONAL water resource survey has rapidly emerged from the organizational stage, and the eight regional engineers, appointed to report on the drainage basin areas, met in Washington last week to effect proper coordination of effort.

THE TRANEBERG BRIDGE, a notable 593 ft. concrete arch span in Stockholm, was officially opened by the King of Sweden, Aug. 31. The structure, which will connect the main city with important suburbs, was described in *ENR,* June 7, 1934. p. 727.

DOUBLE SHIFTS are working in over one-third of the non-federal PWA projects, according to Administrator Ickes. Use of double shifts by contractors is being encouraged by the PWA to speed the recovery program and aid employment. Crews work from 7 a.m. to noon and from noon to 5 p.m.

TENDING TO BALANCE Midwest drought news is the report that Washington, D. C., has already exceeded the existing rainfall record for September, having received 13.42 inches as compared to the 10.81-inch figure for September, 1876.

MEXICO has appropriated $1,300,000 to build a dam on the San Juan River, in the lower Rio Grande Valley, to provide storage for irrigating 100,000 acres of land suited to citrus culture.

A FOURTEEN-WEEK canvass to stimulate home modernization in New Orleans resulted in a sign-up of 9,654 pledges representing promised expenditures approaching $5,000,000.

DALLAS has been selected as the site for the centennial celebration of Texas independence, to be held in 1936.

In This Issue:

AN INVENTORY of TVA accomplishments as this large scale undertaking closes out its second summer is presented in a report written from a close observance of engineering progress and the evolving of broad policies. The program of river control is reviewed briefly and special analysis is made of the much-discussed phases of power sales, industrial planning, agriculture and public reaction.

INDUSTRIAL PLANTS on the upper Potomac River have developed water requirements for waste disposal far exceeding the low flow of the stream. An abstract of a report on storage possibilities indicates that an earthfill dam 155 ft. high will increase the low flow from 15 to 60 m.g.d. which will benefit many communities.

MODERN CONCRETE PAVING methods, including newest types of equipment, curing under cocoa blankets and the installation of an unusual style of expansion joint, are reviewed. Design features for this highway were the subject of an article last week (p. 305) and the present description concludes this two-part review of a notable New Jersey highway project.

EVOLUTION in trainshed design in a quarter century is clearly shown in a description of the recently rebuilt trainshed for the LaSalle St. Station in Chicago. When the lofty steel-arch shed of 212-ft. span was built in 1903 it was the last word in passenger terminal design. Now it is being taken down, having been replaced by a low flat structure requiring only a little over one third the amount of steel and giving promise of longer life and less maintenance cost.

WITHIN A PIER SHED on Staten Island, N. Y., relief workers have constructed a recreation center including an auditorium and sport and amusement facilities. The feature of the article is the hand-fabricating of 300 tons of steel framing in an effort to spread labor in this work-relief project.

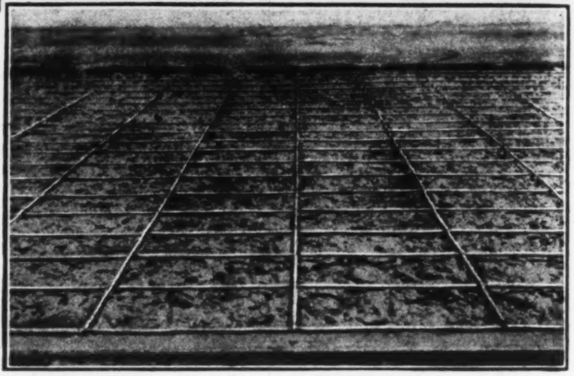
THE FIELDS in which engineers may be of assistance in reducing traffic accidents are outlined in detail in this issue. For some types of accidents the engineer's service is of direct usefulness; for others his studies can have only an indirect application.

HAULING, as a phase of construction activity, is discussed by J. L. Harrison supplementing his series of ten articles on the management side of contracting which appeared several months ago. The key to successful hauling is its proper synchronizing with the other operations. Based on the assumed rate of production, hauling requirements should be accurately analysed and equipment and program organized accordingly.

Coming Articles:

SHUT OFF from the remainder of New Hampshire by the many-branched estuary waters of Great Bay, Little Bay and several rivers, the city of Portsmouth, N. H., is about to have main road connections that rank high among recent highway improvements. A 1,538-ft. high-level steel bridge and some ten miles of paved road forming this connection will be described in the next issue. The swift tidal currents called for special construction methods of interest.

FOR LONGER ROAD LIFE



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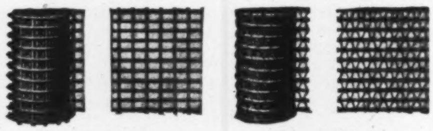

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Triangle Mesh

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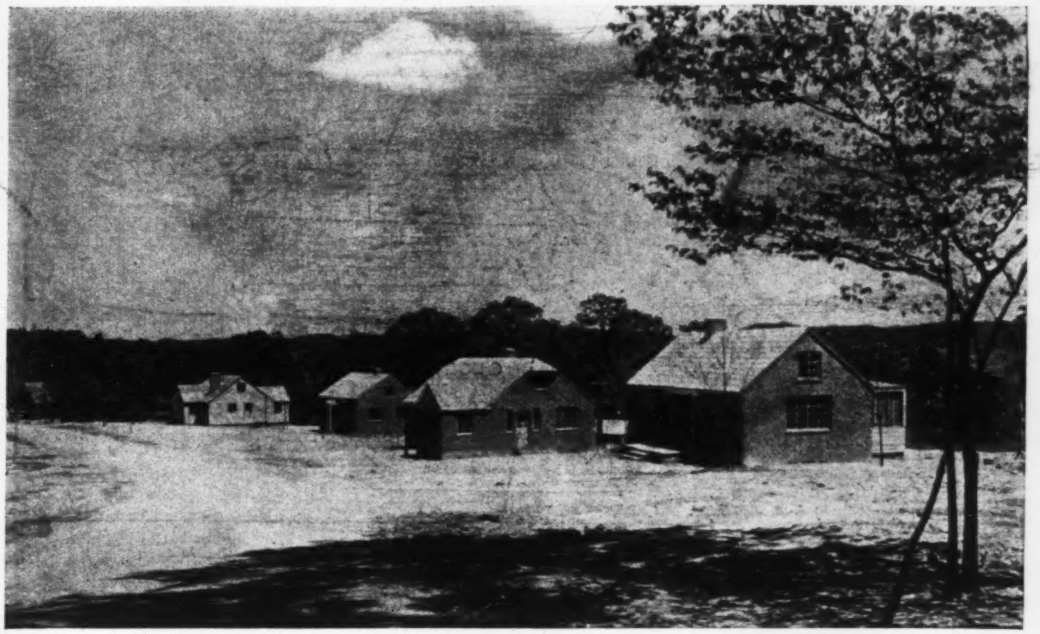


FIG. 1—THE VILLAGE OF NORRIS near Norris Dam on the Clinch River above Knoxville is concrete evidence of the TVA's ideas of what a planned community should be. The houses are compact and substantially built and are equipped to take full advantage of cheap electric power.

An Appraisal of Progress Made to Date by the TVA

Engineering and construction operations well advanced—Domestic power-sales policy producing results in scattered localities—Little accomplished in developing new industries and in improving agricultural conditions

By S. T. Henry
Southeastern Representative, Engineering News-Record Spruce Pine, N. C.

THE Tennessee Valley Authority approaches the end of its second summer with a very definite record of accomplishments to its credit along several of the lines of action laid down for it when it undertook the economic development of the Tennessee River Basin in May of last year. Along other lines it has made little progress. Engineering and construction features of the undertaking have shown good progress. Experiments in the expansion of domestic consumption of electricity indicate that this phase of the work will attain notable success. But the great underlying economic planning that was expected to revitalize living conditions in the valley remains in the drafting stage. Just when a start will be made in that direction is a question. Added industrial development also still is in the formative stage, with prospects good for the establishment of many industries using new processes made possible with low-cost power, by a wide variety of raw materials and by favorable local conditions. When it comes to the contemplated remaking or readjustment of agriculture in the valley, little has been done. Probably this greatly needed work will receive impetus from TVA fertilizer manufacturing, which ought to be under way in ample time for 1935 crops.

The TVA has two great dams under construction: the $34,000,000 Norris Dam, which is primarily for storage and flood control (*ENR*, July 12, 1934, p. 44); and the $28,000,000 Wheeler Dam on the Tennessee, 16 miles above Wilson Dam, a combined power and navigation project (*ENR*, April 26, 1934, p. 525). Work on both these dams is up to or ahead of schedule.

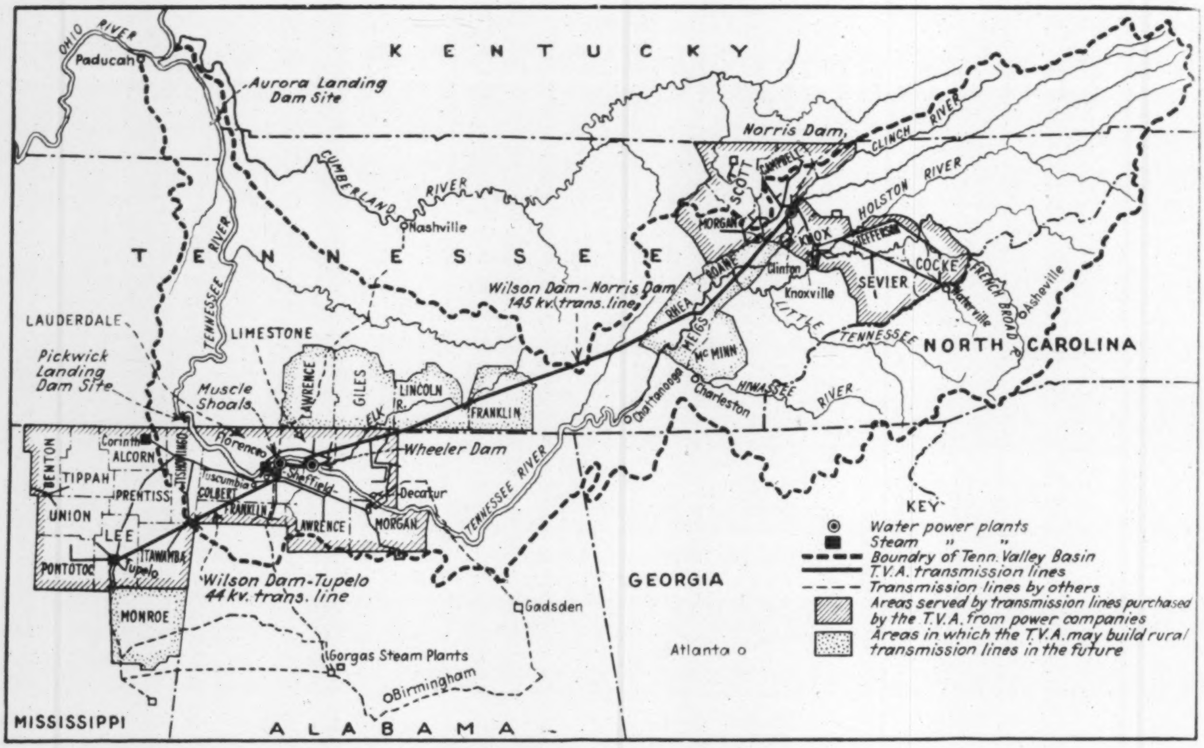

KENTUCKY
OHIO RIVER
Paducah
Aurora Landing Dam Site
CUMBERLAND RIVER
Nashville
TENNESSEE
TENNESSEE RIVER
Norris Dam
CLINCH RIVER
HOLSTON RIVER
SCOTT
CAMPBELL
MORGAN
KNOX
JEFFERSON
ROANE
Clinton
Knoxville
COCKE
SEVIER
Waterville
FRENCH BROAD R.
Asheville
Wilson Dam - Norris Dam 145 kv. trans. line
RHEA
MEIGS
McMINN
LITTLE TENNESSEE
NORTH CAROLINA
Chattanooga
Charleston
HIWASSEE RIVER
LAUDERDALE
LIMESTONE
Pickwick Landing Dam Site
Muscle Shoals
LAWRENCE
GILES
LINCOLN
ELK R.
FRANKLIN
Corinth
ALCORN
TISHOMINGO
Florence
Wheeler Dam
BENTON
TIPPAH
Tuscumbia
Sheffield
PRENTISS
COLBERT
Decatur
UNION
FRANKLIN
LAWRENCE
MORGAN
TENNESSEE RIVER
LEE
ITAWAMBA
PONTOTOC
Tupelo
Wilson Dam-Tupelo 44 kv. trans. line
GEORGIA
MONROE
Gadsden
Gorgas Steam Plants
Atlanta
Birmingham
MISSISSIPPI
ALABAMA
KEY
◎ Water power plants
■ Steam " "
Boundry of Tenn. Valley Basin
T.V.A. transmission lines
Transmission lines by others
▨ Areas served by transmission lines purchased by the T.V.A. from power companies
░ Areas in which the T.V.A. may build rural transmission lines in the future

FIG. 2—TENNESSEE RIVER BASIN, showing the power sites being developed by the Tennessee Valley Authority and the areas in which it is beginning to sell power.

With the exceptionally strong construction organizations in charge of each of them, and with plant and equipment specially suited to the conditions to be met at each site, it appears that these undertakings ought to be finished ahead of time. Neither involves any serious construction problems. (For profiles of the river and its tributaries see *ENR*, May 11, 1933, p. 581.)

Studies for other dams

An appropriation of $48,000,000 was made to the TVA by the last Congress to start the construction of four more of the several principal dams required for stream regulation and power development on the Tennessee and its tributaries. Those tentatively planned for early attack were as follows: Aurora Landing, which is the first of the proposed dams on the Tennessee upstream from the Ohio; Pickwick Landing, which is at the head of slackwater from Aurora Landing; a dam on the Hiawassee and one on the French Broad River, both of which are mountain tributaries. Both Aurora and Pickwick form long pools for navigation, similar to Wilson and Wheeler and like them will contain run-of-the-river power plants. When they are completed, the Tennessee River will be canalized for 9-ft. barge traffic nearly to Chattanooga, over 300 miles from its mouth.

Dams on the Hiawassee and French Broad will be essentially for flood storage. These two streams and the Little Tennessee have high-mountain drainage basins, largely in North Carolina, over which average annual rainfall ranges from 50 up to more than 80 in. They produce much of the unregulated low flow in the Tennessee and a surprisingly large part of its total runoff.

Aurora Dam by itself would be an uneconomic project. In the first place, the foundation conditions are unsatisfactory. Then even the low dam contemplated will drown out great areas of fertile bottom lands which are now only occasionally flooded under the existing unregulated streamflow. During high water in the Ohio, backwater in the Tennessee will rise almost to the crest of the dam, thus cutting the power head down to nothing and making it impossible to develop power continuously at the dam. Considered by itself, this condition would make the site uneconomical for power development, but when considered as the site for one plant of a system, including Muscle Shoals and other up-river plants, it acquires an entirely different character, for when it is drowned out there is an excess of power upstream.

Preliminary investigations of the Pickwick Landing site indicate that better foundation conditions will be secured there. It will be a run-of-river power plant.

Studies are being made by the TVA of the possibilities of digging a canal across a low divide in Northern Mississippi to connect the Tennessee with the Tombigbee River, flowing into the Gulf of Mexico. Until these studies determine whether such a canal is a sound undertaking, final design of Aurora and Pickwick must be held in abeyance. Meanwhile, complete investigation of both sites is proceeding with the expectation that actual work may be started without delay.

Land ownership, private and public property damage and a number of other complications make the determination of suitable storage reservoir locations on either the Hiawassee or the French Broad difficult. In fact, on every dam project that the TVA has under way or in contemplation for early beginning these problems are much more controlling than any physical conditions. For example, in the case of a reservoir site on the French Broad River found by the Corps of Engineers, U. S. Army, to be desirable from a physical viewpoint, the TVA has announced that the project has been found to be economically unsound, at least for the present.

Such complications may even render anything approaching complete regulation of the Tennessee impractical on the basis of present business economics. Whether national interest based on fundamental regional planning and proper utilization of land and other natural resources will justify or even force certain ordinarily uneconomic projects to be included in the general program for the regulation of the Tennessee remains a moot question. If and when power from the great run-of-the-river developments can be sold on long-term contracts or for uses that hold up through varying business conditions, these now unsound projects begin to come into the picture as both sound and necessary.

Experienced public utility operators are practically a unit in doubting that such a market may be found. But it seems too soon to draw such a conclusion. The results obtained by the subsidiary of the TVA, the Electric Home and Farm Authority, justify confidence that domestic consumption of electric energy may be surprisingly increased by a combination of low-priced appliances and cheaper current.

Extensive industries, based on new processes utilizing low-cost TVA power, which already are planned for the valley, seem likely to offer an outlet for a surprising volume of energy. Some of these consider operating on secondary and even on dump power, which presents another phase, in the economics of the regulation of the Tennessee on the basis of power navigation and flood control. Hence, conclusions are premature as to what may or what may not be done in the way of building dams not yet justified. Meanwhile, TVA is getting fine cooperation from all state and local officials in the avoidance of further public improvements in projected reservoir overflow areas. Private owners are unlikely to build where they may be overflowed later.

Increased power use

While the readers of this journal may consider that the power phase of the TVA project may be of only minor importance to them, it appears that in this direction may be found the answer to some of the engineering and economic problems of the entire valley undertaking. In fact, progress in increasing domestic electric consumption in the few scattered towns in the valley where there has been time to show results is quite surprising. Private utility officials, on the other hand, consider that one swallow does not make a summer. They also question whether all the factors involved have been considered. The fact remains, however, that the greatly reduced TVA rates to the householder and farmer, combined with some clever publicity and promotion and with lower-cost appliances such as refrigerators, ranges and water heaters, have produced increases in the use of electricity that go beyond even TVA expectations.

Whether these showings can be maintained over large areas and over long periods is yet to be determined. Even though somewhat less favorable results are obtained on anything approaching a valley-wide scale, this increased use of electricity in the home and on the farm appears to have possibilities in the way of justifying power developments, now considered unsound, that will cause the civil engineer to realize that the TVA policies in regard to the sale of electricity to the domestic consumer actually may revolutionize the economics of the power-generating industry.

Along these same lines, what the Electric Home and Farm Authority has done in changing the thinking of the makers of electric appliances in regard to the market for reasonably priced units is one of the outstanding TVA accomplishments to date. For years there has been a stalemate between operators of public utilities and makers of appliances on how to break into the mass market for such equipment. The operators contended lower prices for appliances was the answer. The manufacturers held reduced rates for current would get the result. The TVA decided both would bring a quick solution, and they have.

Basing its hopes on somewhat smaller sizes, less highly finished products, simplification of design to permit mass production and similar economies, the Electric Home and Farm Authority has induced practically all of the leading makers of appliances to come into the market with units selling at prices far below those obtained a year ago. Designed primarily for sale in the valley and in territories where rates low enough to meet TVA approval are in

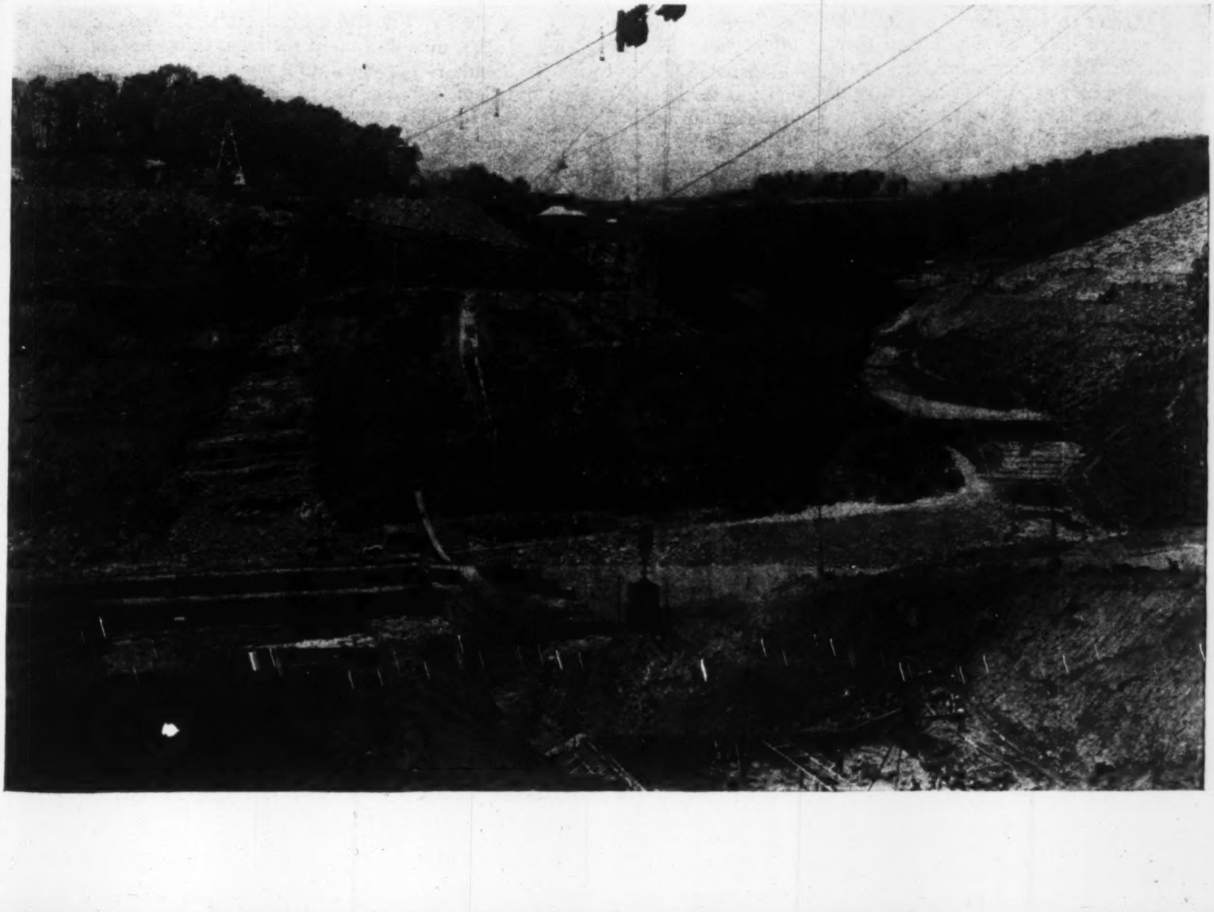


FIG. 3—CONSTRUCTION of a great storage dam on the Clinch River at Cove Creek was called for in the act creating the TVA. Pouring of the 1,000,000 cu.yd. of concrete required for the structure and its appurtenances, now called Norris Dam, was begun several weeks ago.

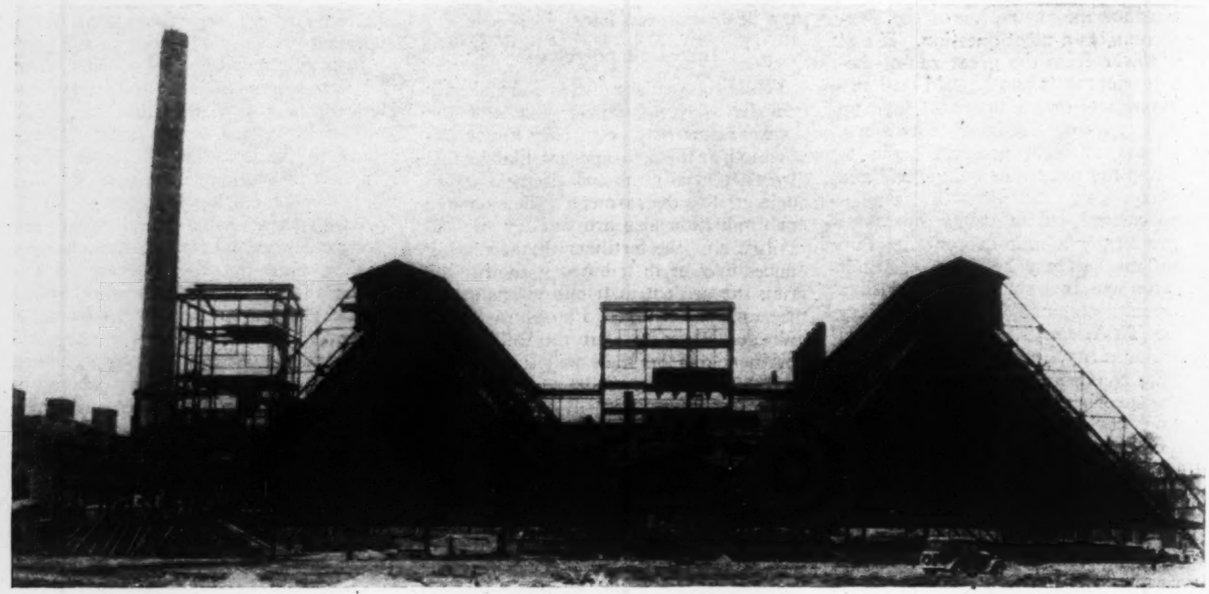


FIG. 4—A DEMONSTRATION PLANT for the manufacture of phosphate fertilizer is under construction at nitrate plant No. 2 at Muscle Shoals.

effect, these low-cost units are now being offered nationally. Too early yet to know all the effects on the electrical industry, the latter is becoming aroused to its new possibilities for increasing the domestic load. Incidentally, about 70 per cent of the total income of the utilities in the past came from this load.

The Electric Home and Farm Authority financing of both the manufacturer and the purchaser of appliances approved by it is a factor that is playing a leading role in this phase of the TVA program. But EHFA neither manufactures nor sells appliances. In fact, its policies are drawn specially to protect existing agencies engaged in all steps of making, selling and installing appliances.

Industrial possibilities

While there have been comparatively few heavy industries established in the valley in the past, there is a surprising amount of highly diversified and specialized manufacturing. Much of this has been built up in the last two decades, and textiles particularly in the last six or seven years. The coming of great blocks of TVA power into a territory already having a surplus means that the TVA will have to sell to industries at rates below any that have obtained in the Southeast. Industrial power rates in that section are lower than in any other part of the country east of the Rockies. The TVA has announced no wholesale industrial power rates. Indications are that it will be willing to take such business in large volume at high load factors at from 4 mills down to as low as 2 mills per kilowatt-hour for firm primary power.

Such rates as these open entirely new opportunities for various lines of processing industries. Concerns interested in the production of basic chemicals, pure metals, firing of fine ceramics and other similar industrial processes requiring close controlled heat at low cost already are actively prospecting possibilities in the valley. Finishing industries based on these semi-finished products and on the raw materials of the valley also are known to be studying the situation closely.

The position of the Tennessee Valley Authority in regard to industrial expansion in the valley has been the opposite of that followed in the past by private utilities. No power sales department has been established. No efforts have been made to attract industries from other sections of the country, but TVA engineers have been studying to determine lines of manufacturing for which conditions in the valley are attractive that might make products now being imported. Starch, special steels, fine ceramics and chemical raw materials are among those that have been specially studied. Some of these researches have been made independently, others carried out in cooperation with private industry. All are undertaken with the basic idea that the Tennessee Valley project is a national experiment in the execution of which no section of the country should be harmed.

While it is too early to see the results of this policy in building a vast power load, the prospects for its success appear good. In the long run, however, it does seem that TVA will have to do more selling of power in the way that private utilities have found necessary.

So much has appeared in the lay press of the country about the TVA plans for fireside and barnyard industries that there are quite widespread misconceptions of what might be done along those lines. Undoubtedly much may be accomplished in the way of establishing small industries that are purely local or that employ only a few hands on simple or artisan work.

The immense cheap wood resources of parts of the valley offer one line that might be developed. Handicrafts of various sorts already give income to a considerable number, specially in the mountain sections. These might be expanded to some extent without breaking the market. But, on the whole, to accomplish the balance between industry and agriculture which is one of the prime objectives of the TVA means larger manufacturing establishments. TVA's frequently announced opposition to great industrial centers will not need to be set aside, since even the heavier lines of manufacturing all over the country are trending rapidly toward decentralization.

Agricultural stabilization

Thus far TVA has accomplished nothing in the way of tangible results in a program for stabilization of agriculture in the valley. Such a program is confronted by numerous factors that conflict not only with the diversity of interests in the valley but also with those of the country as a whole. Conditions in the valley also vary so widely that no general plan will fit. When it comes to working out a program for the farmers of a territory that extends as far east as central Pennsylvania and as far west as mid-Illinois, with altitudes from nearly sea level to over 6,500 ft., there are many physical problems to be solved.

Widely differing social standards

over the valley are probably more serious in determining an agricultural program than those which the varying soils, climate and altitudes introduce. In fact, it is certain, social standards and their attendant landlord-tenant single-crop system that up to now have offered the most serious handicap to agencies that have tried to diversify and improve farming methods in great areas of the valley.

The TVA wisely has recognized these high hurdles that any valley-wide agricultural program has to top before such a program can get under way. It also recognizes that the existing federal, state and county agricultural agencies, which in some sections of the valley have contributed much to the advancement of farming, must be the channels through which it must work. To this end, it is proceeding more as a catalyst than as a reaction agent.

This agricultural policy may work out eventually. Any policy having to do with the established ways of farmers will make progress slowly, unless markets at profitable prices are obtained. With better markets in sight through the evident coming of industries to the valley, the solution of what is an acute farm problem in many parts of the latter ought largely to correct itself.

Marginal lands

Taken as a whole, there are great areas of the valley that were from the beginning unsuited for farming. A vast additional acreage has been rendered unprofitable for crop culture by past farming methods that resulted in staggering soil erosion under the heavy rainfall. Much of these submarginal lands are destined to be retired permanently to forests.

Already various federal forests, parks and other reservations have taken up more than 3,500,000 acres of such lands. No TVA policy has been announced in regard to further rapid retirement of these lands, which produce so little that their occupants scarcely exist on them. It is evident from the federal government's moves made in the valley during the past year, however, that in the next few years more of these acres will be turned back to timber production than the total retired thus far. Policies of the present federal administration also justify this conclusion.

Fertilizer manufacture

One of the specific jobs assigned to TVA by the act creating it was to make fertilizer on a sufficiently large commercial scale to enable the farmer to buy at lower prices. All the soils of the valley lack phosphorus; most of them need nitrogen and potash. There is an excess of nitrogen production in the country. Potash production in the valley is not practical with any method thus far commercialized. Extensive deposits of phosphorus occur in the valley. Hence, the TVA is making phosphoric fertilizers the first step in its program.

With a new plant in connection with idle Nitrate Plant No. 2 at Muscle Shoals, TVA is setting out to make phosphoric acid by electric-furnace methods that are reported likely to reduce materially the cost of the fertilizer delivered to the farmer. Other methods of production also are to be tried.

Just how the fertilizer that TVA produces may be distributed without upsetting the present distribution channels is yet to be determined. Phosphorus works wonders on pastures in the valley where permanent sods that will carry more livestock will be badly needed in the near future. Practically no fertilizer is used on valley pastures now. Building valley pastures with cheap fertilizer may be an easy way to solve the distribution problem, improve farming and stop soil erosion. It is along these original, pioneer lines of procedure that TVA's record to date indicates that its organization is ready to think.

TVA and private business

Except for electric power and fertilizer, TVA has neither the authority nor the funds to go into any line of business. Through a subsidiary it has set up a few small canneries, a creamery and some other limited and strictly local enterprises producing largely for communities that lacked the commodities made. TVA has shown no desire nor intention to become a factor in the national market in any line. On the contrary, its EHFA policies indicate that it realizes that its great opportunity lies in assisting existing business concerns and agencies to make more of their opportunities. With adherence to such policies, TVA is building up a confidence in its leadership and influence that already has crossed valley borders.

TVA and politics

From the beginning, TVA has refused to recognize political influence either in hiring staff or in making purchases. Such a policy in a territory where politics is a business and disorders at the polls are regular incidents appeared to be a difficult one to follow, but TVA not only has accomplished it, but has won the respect of the political bosses of the valley, even though they still hammer for jobs for their henchmen.

From the beginning the TVA has suffered from too much exaggerated publicity from newspapers and magazines that were friendly to its program or saw in the program material for a human-interest story. On the other hand, many of the dailies of the valley were honestly opposed to the TVA power policies, and some of them to what they expected to be a paternalistic super-government. So far as the average man on the street or the hillside was concerned he knew little a year ago about what was planned and apparently cared less, unless he could get a job.

Unfortunately, too, much of the sob-story stuff still appears in publications that ought to be better informed. Taking freak pictures and chance interviews as a basis, many space writers have played up the TVA plans for social readjustments in ridiculous fashion. Reams have been written and as much spoken about the poor benighted hillbillies for whom TVA is going to provide a fine farm home with a house all lighted, heated and cooled electrically.

Few outsiders have sensed that there are towns, cities and whole sections of the valley in which the standards of living already compare favorably with those of any area of similar density of population in the country. There is an element of culture in many of these sections that is justly proud of its accomplishments. To those of this culture the unsolicited propaganda on the need for local social uplift has been a deep affront. Except for this negative reaction to the ill-advised and unofficial TVA publicity, there is growing confidence in the valley in the TVA organization and its program. Even most of the former hostile newspapers of the valley and contiguous area are becoming TVA supporters.

In areas where TVA has had active projects the people have become real enthusiasts for the program. This is specially the case in the territories where TVA power and low rates have become available. This enthusiasm is extending rapidly over the rest of the valley.

Given no bad breaks, the TVA appears likely to have almost unanimous support from the rank and file of the people of the valley in the near future.

◆

Land-Utilization Legislation Foreseen in Detroit

Detroit has 108 miles of business frontage in use, including vacant stores, whereas it has 640 miles set aside for this purpose. Also large districts are set aside for industrial use which, according to Walter H. Blucher, city planner, industry trends indicate never will be taken up. Large cities are not going to grow as they have in the past, and in his opinion, the tendency toward decentralization is definite and will affect zoning technique. CWA workers in Detroit made an inventory of all buildings in the area inside Grand Boulevard and FERA labor is working on the remaining area of the city. When this is complete and the data digested, the City Plan Commission will draft a land utilization ordinance to delimit proposed districts of single residence, general residence, business, light and heavy industry.

Storage Dam Recommended to Control Upper Potomac

Earth dam proposed on Savage River to impound 6½ billion gallons —Will increase dry-weather flow in upper Potomac to 60 m.g.d.

TO RELIEVE the condition of gross pollution of the upper Potomac River, and to increase the amount of water available for industrial use during periods of low streamflow, a recommendation has been made for the construction of a 155-ft. earthfill dam on the Savage River, one of its tributaries. The proposed dam would impound about 6½ billion gallons of water and would make possible a five-fold increase in the dry-weather flow of the Potomac.

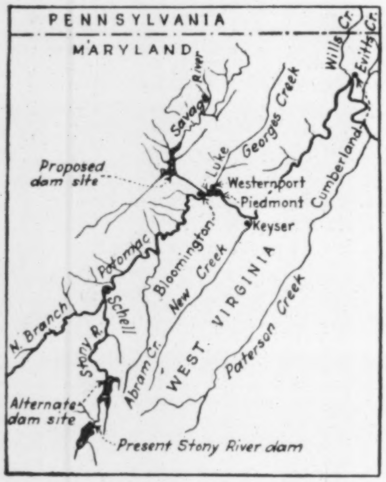

PENNSYLVANIA
MARYLAND
Savage River
Wills Cr.
Evitts Cr.
Georges Creek
Luke
Proposed dam site
Westernport
Piedmont
Keyser
Cumberland
Bloomington
New Creek
Potomac
N. Branch
Schell
Stony R.
Abram Cr.
WEST VIRGINIA
Paterson Creek
Alternate dam site
Present Stony River dam

FIG. 1—SITE of the proposed dam on Savage River to increase the dry-weather flow of the Potomac.

Numerous municipalities and several large industries are dependent upon the upper Potomac both for water supply and for carrying away municipal and industrial waste. These demands on the stream have grown rapidly in recent years by reason of the introduction of several large industries and the consequent growth of the communities along the river.

The West Virginia Pulp & Paper Co., at Luke, uses about 750 m.g. of water per month; the Celanese Corp., a rayon manufacturing plant just above Cumberland, uses about 800 m.g. per month and expects to use more if it becomes available; the Kelly-Springfield Tire Co., at Cumberland, requires about 1,000 m.g. per month, and the Potomac Edison Co. uses about the same amount. In addition to the wastes discharged by these industries, the city of Cumberland discharges its sewage into the river. As a consequence, in dry weather, with the flow reduced at Cumberland to about 17 m.g.d., the condition of the river is most insanitary.

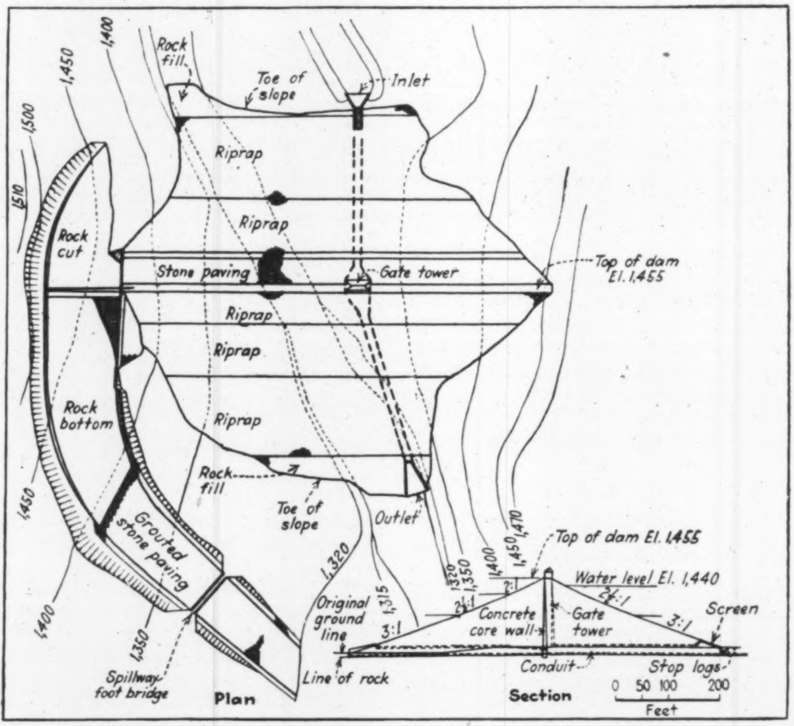
A number of years ago the West Virginia Pulp & Paper Co. recognized the necessity for more water for its own use and constructed a reservoir having a capacity of about 2 billion gallons on the headwaters of the Stony River, a West Virginia tributary of the Potomac. This reservoir has helped the situation materially, but because of the increasing demand further augmenting of the dry-weather flow is again badly needed.

An organization known as the Upper Potomac River Board was formed a few years ago to consider what remedies could be employed for this situation. The members of the board are representative of the industries already mentioned. Last fall the board retained as consulting engineers Gannett, Seelye & Fleming Engineers, Inc., of Harrisburg, Pa., to make an examination of the situation and to suggest a method by which the dry-weather flow might be increased. The problem was to increase the minimum flow of the Potomac from about 15 m.g.d. to as near 80 m.g.d. as could reasonably be expected after study.

After examining the tributaries of the Potomac above Cumberland it was found that only two showed possibilities of storage in sufficient volume far enough up the river to benefit the many communities involved. These two streams were the Stony River in West Virginia and the Savage River in Maryland. Surveys were made of possible dam and reservoir sites on both rivers, and it was finally determined that a dam on the Savage River, about 5 miles above its confluence with the Potomac, would afford the surest and best storage to accomplish the results desired. It was found possible, with a reasonable expenditure of funds, to increase the flow to 60 m.g.d. This will take care of practically all the needs of the communities and will afford a reasonable degree of dilution of partly treated sewage at Cumberland. The other cities and towns to be benefited by the increased flow include Piedmont, W. Va., Westernport, Md., Keyser, W. Va., and Hagerstown, Md.

A study of precipitation and runoff records revealed that the extreme drought period in the Potomac, over a long terms of years, was that of 1930 and 1931. During that drought the river at Bloomington had a minimum discharge of about 12 to 15 m.g.d., which included some flow from the dam on Stony River. At that point the drainage area of the Potomac is about 300 square miles. At the same time the discharge of the Potomac at Cumberland, where the drainage area is about 900 square miles, was about 30 m.g.d., including the flow of Wills Creek and the water

FIG. 2—EARTHFILL DAM 155 ft. high to impound 6½ billion gallons of water.


1,400
1,450
1,500
1,510
Rock fill
Toe of slope
Inlet
Riprap
Riprap
Rock cut
Stone paving
Gate tower
Top of dam El. 1,455
Riprap
Riprap
Rock bottom
Riprap
Rock fill
Toe of slope
Outlet
1,450
Grouted stone paving
1,400
1,350
1,320
1,315
Spillway foot bridge
Plan
Original ground line
Line of rock
1,320
1,350
1,400
1,450
1,470
Top of dam El. 1,455
Water level El. 1,440
2:1
2½:1
2½:1
3:1
Concrete core wall
Gate tower
3:1
Screen
Conduit
Stop logs
Section
0 50 100 200
Feet

diverting through the Chesapeake & Ohio Canal.

The dam site selected on the Savage River has a drainage area above it of about 105 square miles, and for the minimum year the stream at that point has an average yield of about 112 cu.ft. per second. The actual minimum daily flow was about 1 m.g.

The storage needed behind the proposed dam is that sufficient to keep the flow of the Potomac River up to 60 m.g.d., and, based on the experience during the drought of 1930-1931, this would require storage of about 6½ billion gallons, the normal dry-weather flow of the stream taking care of absorption and evaporation.

One of the advantages of the proposed reservoir site on the Savage River is that it is close to the point of water use, as it is only 4 or 5 miles above Luke. Further, it is easy of access and could be regulated and controlled better than a dam and reservoir on Stony River, which would be 30 or 40 miles farther away and from which some water would be lost by absorption and evaporation in traveling that distance.

An earth dam has been designed for the Savage River site, 155 ft. high, with a concrete corewall and a spillway through the rocky mountainside at one end of the dam. The excavation from this spillway would be used to build a rock toe along the downstream side of the dam. The valley above is practically uninhabited and unused; the timber was cut from it years ago, and there is no underlying coal. The estimated cost of the structure is about $1,260,000, or $194 per m.g. stored. A gravity concrete dam would cost nearly twice as much.

The engineers' report recommending construction of the dam has been accepted by the Upper Potomac River Board and has been forwarded to the state engineer of the PWA of Maryland. It has received his approval and has been sent to the Public Works Administration at Washington.

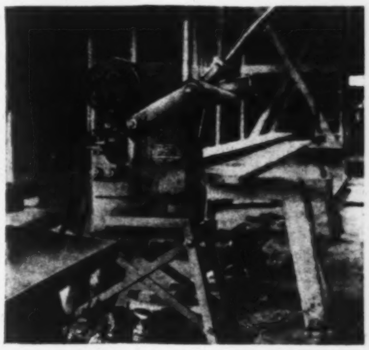
It is hoped to obtain federal funds in whole or in part to construct the dam, as the improvement will benefit communities in several states and the Potomac River as a whole from above Cumberland down to Washington.

Pier Rebuilt for Recreation Center by Relief Workers

Alterations to single-deck pier on Staten Island, including fabrication of 300 tons of steel, are carried out with hand tools and minimum equipment

By A. C. Babcock

Senior Engineer, Dept. of Public Welfare, Works Division, New York City



FABRICATING PLANT consisted of two hand punches and electric hand drills to handle 300 tons of steel.

One of the large and interesting projects developed under the CWA and now being completed by the department of public welfare, New York City, is a recreation center at Pier 6, Tompkinsville, Staten Island. This pier is a single-deck structure built in 1920 and consists of a concrete slab 1,120 ft. long by 125 ft. wide, supported on wood piling, with a single-story steel superstructure. The alteration and remodeling of this pier into a recreation center, which will include a large auditorium, sport and amusement facilities, a beer garden, a children's playground, 10,000 sq.ft. of office space on the shore end of the pier and concessions to be operated by the Borough of Richmond for the use and benefit of the people of Staten Island, constitutes a construction project of considerable size and exemplifies some unusual ideas.

Because of the special character of this project and the range of services to be provided, considerable preliminary study was made of different types of construction, layouts and space usage before the final design was adopted. A serious design complication resulted from the fact that the detail shop drawings of the original structure could not be located and the new work had to be designed on field measurements. The wall construction to be used had to be flexible enough to withstand considerable movement and swaying of the pier due to possible impact of vessels. Further, it had to be fireproof and comply with the city code for buildings of public nature.

In addition to these requirements, the authority to use the pier was qualified by the obligation to make no permanent changes in the original structure. No structural members were to be removed and no holes or other changes in these members were permissible in order that the pier might, at some future time, be restored to its original use.

Design adopted

The construction finally adopted consists of a steel frame, fastened to the existing trusses and encased in an 8-in. brick wall to the height of 8 ft. 4 in. above the pier deck. The wall above this brickwork is a 2-course portland cement plaster on metal lath. The interior partition walls are also plaster on light steel studding.

In general, the construction might well be described as a building within a building, since the present exterior walls of the pier have steel turn-over doors in every panel that opens the structure to the cooling ocean breezes. The 13-ft. space between these doors and the new walls provides a passageway for trucks, automobiles and people entering the pier. The outside pier doors will be open most of the time when the new recreation facilities are in use, so that the new construction was designed as if it were a separate building in the open.

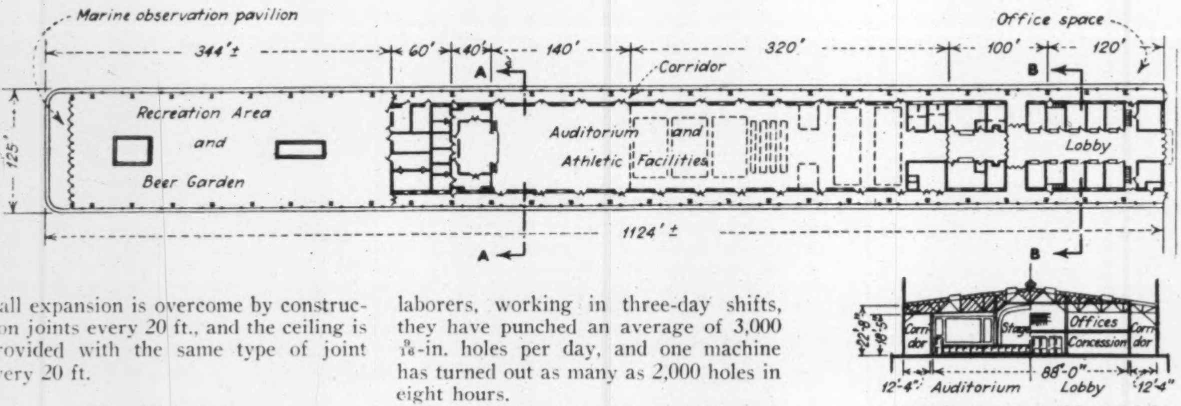
Comparative cost studies showed that the lath-and-plaster construction as used not only reduced expenditures for material to one-half that of prepared wall and asbestos boards but also provided a greater distribution of labor among the trades in keeping with the endeavor of the CWA to create the maximum amount of work.

The typical wall framing consists of 4-in. I-beams spaced on 10-ft. centers extending to the floor and encased in the brickwork, with intermediate posts of 4-in. channels set on top of the brick wall. All horizontal members are 4-in. channels bolted to the vertical posts with clip angles. All windows are standard steel sash.

The steel ceiling framing is hung directly on the existing trusses, which are on 20-ft. centers, and consists of 7-in. channels spaced on 9-ft. centers between the trusses with 3-in. channels spaced on 2-ft. centers at right angles. These cross-members are fastened below the main channel beam with short pieces of angles having two bolts in each leg so that the stress in the flanges of the main 7-in. channels, in accordance with the specifications (16,000—150 l/b), does not exceed 14,500 lb. per sq.in. The unsupported length of these main members is taken as 2 ft., on the assumption that the connection between the 7-in. channels and the 3-in. channels was sufficiently stiff to prevent buckling in the compression flanges.

The ceiling construction is of cement plaster on metal lath fastened directly to the 3-in. ceiling channels. Skylight openings are framed with sloping sides to allow the maximum of daylight. The ceiling construction weighed about 12 lb. per sq.ft., adding a maximum of 2,000 lb. per sq.in. to the existing stress in roof truss members.

Flexibility in the brick work is assured by providing a series of sections broken up by the door openings. The plaster wall expansion is overcome by construction joints every 20 ft., and the ceiling is provided with the same type of joint every 20 ft.



LAYOUT for a recreation center in a pier shed. Note the corridors left at the sides.

Hand fabrication

Creating the maximum employment for the unemployed was one of the factors in the decision to fabricate the 300 tons of light framing on the job. Steel was ordered cut to length and was sorted and stocked according to a pre-arranged fabrication schedule.

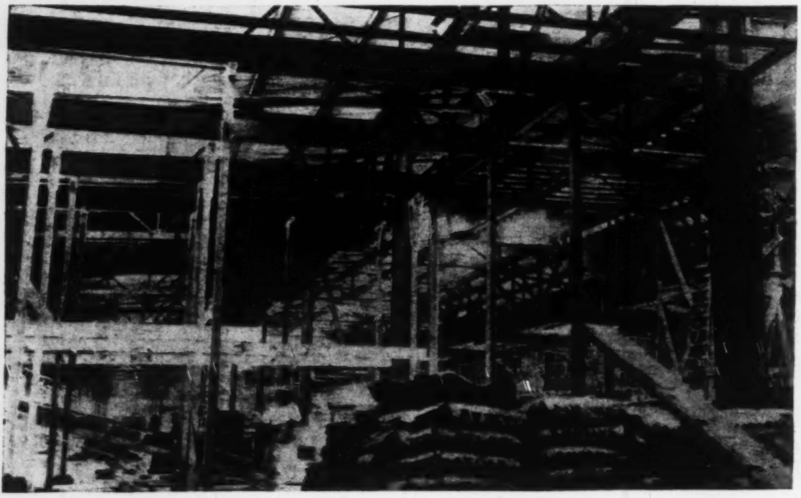
Two layout gangs, each supervised by an engineer and assisted by templet makers, have been kept occupied making layouts, duplicate members being handled in lots as far as possible. Connections to existing members are checked for variations as the work progresses. The framing is punched by hand, distributed by hand trucks and erected either by hand or with rope slings and blocks. Temporary bolted connections are made until the steel is lined up, after which bolts were taken up and threads were butted.

Two hand punches adopted for plate work were purchased and alterations were made on the job by cutting away part of the frame so that the flanges of the beams and channels could be punched. These machines have given remarkable service. In the hand of unskilled laborers, working in three-day shifts, they have punched an average of 3,000 $\frac{9}{16}$-in. holes per day, and one machine has turned out as many as 2,000 holes in eight hours.

Two portable electric hand drills were purchased for drilling holes larger than $\frac{9}{16}$-in. diameter, and one of these was rigged up as a home-made drill press for holes that could not be handled by the punches. This equipment, with the addition of one oxy-acetylene burner outfit and the usual hand tools, formed the entire fabricating plant.

Erection and handling equipment consisted of home-made derricks and hand winches, using ordinary rope tackle.

ERECTION of steel framing was all done by hand, to build walls and a ceiling inside the pier shed, which was not altered.



The entire steelwork is being assembled with bolted connections, a patented rivet bolt being used for the heavier floorbeam supports. Fabrication and erection work was started May 8 and was estimated by the engineers to take 60 working days.

The finished auditorium will be 420 ft. long by 88 ft. wide, with a 13-ft. corridor on each side. It is provided with a stage at one end and is floored throughout with maple flooring. Complete lighting, heating, ventilation and plumbing facilities are being installed, as well as a public address system. Heat is supplied by two low-pressure steam boilers and unit-type heaters. Piping larger than 3 in. is designed for welded connections. Ventilation is provided by electric exhaust fans placed in penthouses in the roof and drawing the air through ducts. The air-change capacity for the auditorium is three per hour, for the office space in summer ten per hour and the toilets 10 changes per hour.

The project was developed by the CWA staff of the Borough of Richmond. W. C. Graham and T. V. Sauvlet are borough engineers, and J. W. Ridgway is assistant borough engineer. Plans and specifications, including all shop details for the steel, were made by the CWA design division with the writer in charge of the design work.

Engineering direction

Construction is being carried out with department of public welfare labor under the direction of the Borough President's office, with William Brown as general superintendent of construction. Borough officials connected with the project are Joseph A. Palma, borough president, George W. Allison, commissioner of public works, and Herman W. Ordeman, consulting engineer for the Borough of Richmond.

The estimated cost is $325,000, and completion is scheduled for September.

Flat Roof for Trainshed Built Under Old Arches

Lofty covering of Chicago station, 31 years old, is replaced by low flat roof with new trusses supported on brackets welded to old columns—Erection methods and alternative designs

By E. E. R. Tratman
Wheaton, Ill.

RECONSTRUCTION of the trainshed roof at the LaSalle St. terminal station in Chicago marks the end of one of the few remaining lofty single-span steel arch roofs which at one time were widely favored for large passenger stations but have now been superseded by simpler structures. In its place is a new low-level and practically flat roof of two spans, having a longitudinal opening or smoke duct over each track. This roof is placed about 20 ft. above the rails and platforms, or a little below the springing line of the old arch trusses. In Fig. 1 are given two views of the new construction under the old arched roof. At the left the new truss framing is in place, with forms erected for the roof slabs along the bottom chords, and a row of the cambered welded trusses for reinforcing the side walls of the concrete smoke ducts over the tracks. At the right is a view above the completed roof slab with its smoke ducts, and a little to the right of the center is the top chord of the longitudinal truss which supports the transverse trusses. A graphic comparison of the old and new roof structures is shown by the cross-section in Fig. 2.

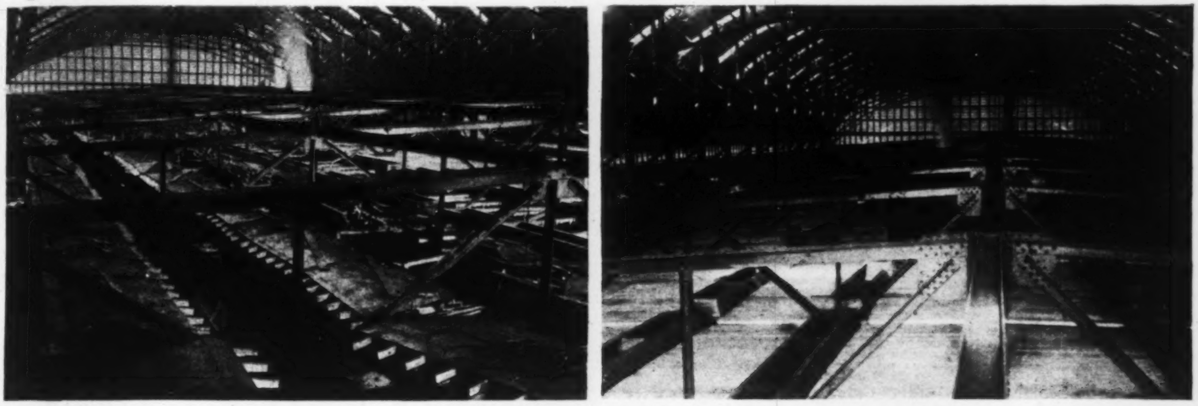


FIG. 1—NEW FLAT ROOF under old arched roof of LaSalle St. Station trainshed in Chicago. At left, new steel trusses erected and forms placed for roof. At right, new slab, showing smoke ducts over tracks.

The LaSalle St. terminal

The LaSalle St. Station, owned jointly by the Chicago, Rock Island & Pacific Railway and the New York Central Lines, was built in 1903 (*Engineering News*, Aug. 6, 1903, p. 116), in connection with the work of elevating the tracks of these railways through the city. It is notable as the first, and for many years the only, Chicago station having a headhouse of the "skyscraper" type (twelve stories). Office floors above the station facilities provide rental space and convenient location for the offices of the railroad companies. The new Chicago Union Station, opened in 1925, has eight office floors above the headhouse, and the foundations are designed to carry a 23-story superstructure.

In the LaSalle St. trainshed are eleven tracks, spaced alternately 12 and 24 ft. c. to c., with five island platforms 15 ft. wide, which are used for both passengers and baggage. There is an 18-ft. platform along the west side and a 5-ft. service platform outside the single track on the east side. Where the platforms extend beyond the 578-ft. trainshed they are covered by steel-frame canopy roofs of the butterfly type. The total width is 212 ft. between wall columns. Foundations for the steel columns of the trainshed roof and floor and the headhouse consist of concrete piers and footings on steel and concrete grillages. For the wall columns, which carry the roof trusses, the grillages are supported by groups of timber piles.

Old steel arch roof

In the original construction (Fig. 2) the trainshed roof consisted of steel pin-connected arch trusses of 212-ft. span, seated on the wall columns and having their end pins 32 ft. above the platform level. The columns are of H-section, composed of an 18-in. I-beam between two 15-in. I-beams as flanges. The trusses, spaced 30 ft. 3 in. c. to c., were connected by lattice girders at the thirteen panel points, and between them was a typical framing of purlins and rafters. Diagonal bracing was introduced in three transverse bays. The radius was about 127 ft. 6 in. for the top chord and 154 ft. for the bottom chord, the latter having a rise of 40 ft.; the truss depth at center was 25 ft. At mid-span the height above platform level was 61 ft. and 86 ft. to the bottom and top chords, or 100 ft. to the crest of the monitor roof.

In the truss design the top chord consisted of two built-up channels $11\frac{1}{4}$ in. apart with 16-in. webs, 3x3-in. flange angles and side coverplates. Verticals or posts were pairs of channels with lacing bars, having the webs parallel with the arch. The bottom chord was composed of 6-in. eyebars, four in each panel, with pairs of 4-, 5- and 6-in. eyebars for the diagonals. Pins were 6 and $4\frac{1}{2}$ in. in diameter for the bottom and top chords respectively, except that 6-in. pins formed the top-chord connections with the wall columns. At each end a kneebrace composed of a pair of 10-in. channels extended from the first panel point of the bottom chord to the top of an 18-in. longitudinal or spandrel I-beam framed against the backs of the columns.

Two projecting skylights, one on each side of the arch, were arranged in each bay. Ventilating louvers formed the sides of the monitor roof. Windows formed a large proportion of the brick side walls below the trusses. At each end of the trainshed the arch was closed by a steel-framed glass screen extending down to about 25 ft. above the rails. Wire glass was used for the window areas, skylights and screens. In spite of the provisions for ventilation, smoke and gases would hang in the roof for a long time before dispersion.

The original roof covering consisted

of 3-in. flat concrete slabs, 2x5 ft., with expanded-metal reinforcement. After a few years the corrosive action of gases from the locomotives caused such extensive deterioration of the slabs, which had no protective facing, that in 1910 they were all replaced with slabs 2½ in. thick, made with denser concrete and wire-mesh reinforcement and having tongue-and-groove edges. These slabs were given two coats of preservative after curing, and the cement mortar of the joints was given a similar treatment after the slabs had been placed. An outer covering of felt laid in pitch completed the roof, which (with occasional repairs) remained in fairly serviceable condition until its removal in 1934. The original weight of structural steel in this roof was 1,950 tons.

Corrosion of the steel trusses and framing has been an increasing trouble for the past few years, due to the attack by smoke and gases, aggravated by leakage and dirt accumulations. In the trusses the corrosion has been most severe at the joints, but the members also have suffered, as well as the comparatively light framing between the trusses.

On account of the large roof area, the difficulty of steel protection and the difficulty of access for inspection or repair work, the cost of maintenance and painting had become excessive. Under these conditions it was decided in 1933 that the 30-year-old structure had reached its economic life limit and should be replaced by a new roof of a less costly type that could be kept in good condition with less trouble and expense.

Alternative designs

A number of designs of low-roof types were considered, preliminary plans and estimates being prepared for several of these. A governing factor was the necessity of avoiding intermediate columns as far as practicable, owing to the comparatively narrow platforms and the impossibility of placing columns between the closely spaced tracks. Furthermore, the presence of a track in the center line of the station prevented a symmetrical two-span layout. The main platforms are about 15 ft. wide, while 18 ft. is the minimum recommended by the American Railway Engineering Association for platforms with columns and used for both passengers and baggage handling, as is the practice at this station. And with a train on each side of a platform the clearance between the cars is only about 13 ft. Other considerations were the necessity of providing for erection work and for the removal of the old roof without serious interruption to traffic or to the use of the platforms.

The principal alternative designs are briefly outlined in the following paragraphs. Other designs were largely modifications of these. All designs utilized the existing wall columns.

1. Plate-girder spans were used, with one row of intermediate columns spaced 30 ft. 3 in. longitudinally. The 113-ft. east span girders were cantilevered 21 ft. over the middle columns to support the ends of the 92-ft. girders of the west span. Depth of girders was from 60 in. at side columns to 84 in. at middle columns. The cement tile roof had no steel exposed above it. The smoke-duct walls were 8½ to 11½ ft. deep, of 6-in. concrete, ¾-in. cement-asbestos board, or ½-in. cast-iron plates. Structural steel weighed 1,415 tons.

2. Rolled-beam spans with four rows of intermediate columns spaced 30 ft. 3 in. longitudinally and 36 ft. transversely. Beams were 27 to 36 in. deep, the latter for the longer side spans. Roof of cement tile, gypsum or metal, with no steel exposed above it. Concrete smoke ducts were 5 ft. 3 in. to 8 ft. 3 in. deep. This design was similar to the Bush type of trainshed roof. Structural steel, 615 tons.

3. A design generally similar to the preceding, but with columns spaced 90 ft. 9 in. longitudinally. This would have necessitated additional foundations and new columns passing through the street-level space used for mail, express, baggage and cab facilities. Structural steel weighed 837 tons.

4. Umbrella-type canopies over the platforms, with the entire trainshed floor made waterproof and adequate drainage provided. This was considered unsuitable for the rain and snow conditions of Chicago. Structural steel weighed 550 tons.

5. Low trusses were of 212-ft. clear span, spaced 30 ft. 3 in. apart, with roof of cement tile or metal sheating along the bottom chords, leaving steel exposed above the roof. Concrete smoke ducts were 3 ft. 3 in. to 6 ft. 3 in. deep. Structural steel weighed 1,421 tons.

6. Rigid-frame structures of several types were considered but, having no abutments to resist thrust, they would have required connecting the legs of the frames by tierods through the trainshed floor, involving difficult and costly work. Structural steel was 704 tons for a continuous-truss design with one row of intermediate columns, 1,500 tons for plate-girder bents with similar columns, and 2,000 tons for girder bents of full span.

Adopted two-span flat roof

A double-span roof utilizing the existing walls columns, with a line of new columns along the middle platform and shallow longitudinal and transverse trusses carrying the roof framing on their bottom chords, was the design adopted, as shown in Fig. 2. Details of the design were affected in various ways by the necessity of adapting the new work to existing limitations. For instance, owing to the layout of tracks and platforms, which did not admit of rearrangement, the two spans are not symmetrical, since a track occupies practically the center line of the station. The new columns are set, therefore, in the middle of the adjacent platform, giving spans of 92 ft. and 120 ft. At their outer ends the transverse trusses are framed against the faces of the original wall columns but below the attachments of the old arch trusses, so that the new roof could be built before the removal of the old one, the latter protecting the construction work as well as the station traffic. For this design, the weight of structural steel is 721 tons, as compared with 1,950 tons in the old arched roof.

New foundations

Since it was considered desirable to avoid such disturbance of the soil as would be caused by driving numerous new piles close to the old foundations and since piledriving would have been difficult and inconvenient, shafts for concrete piers to support the new columns were excavated through the clay by the usual Chicago method and were bottomed in the underlying hardpan about 75 ft. below street level or 60 ft. below Chicago datum. At the bottom the 4½-ft. shaft was belled out to a diameter of 9½ ft. in order to limit the bearing load to 6 tons per square foot. The piers extend almost to the street level and have 5 ft. of the top reinforced by ¾-in. hoops and vertical rods.

The columns are 12-in. H-beams, seated on 3¼-in. rolled-steel slabs, and extend to the tops of the trusses, both longitudinal and transverse trusses being framed against the columns. They are spaced 60 ft. 6 in. c. to c., or double the spacing of the old arched trusses. As these columns intersect one of the lines of 15-in. I-beam stringers in the floor framing of the trainshed, these beams had to be cut away for each column. After erection of the columns, the I-beam webs were attached to the columns by 4x4-in. angles welded to the I-beams and to the column flanges by 2-in. welds at top and bottom of the angles. Holes 2 ft. square were cut in the platform to permit lowering the columns into place.

Trainshed roof framing

A line of longitudinal trusses, 60-ft. 6-in. span, is framed between the new or platform columns. These trusses (Fig. 2) are 11 ft. 6 in. deep, c. to c. of chords, with parallel horizontal chords, and are built up almost entirely of 10-in. H-beams. In the chords the beams are laid flat, the webs in the top chords being punched with drainage holes, while in the bottom chords the web is covered with concrete, as shown. Side plates and shelf angles riveted to the bottom chord are curved to fit the camber of the roof tiles, which are seated on the shelf angles.

Transverse trusses, spaced 30 ft. 3 in. apart, are framed alternately against the columns and the middle posts of the longitudinal trusses. In these transverse trusses, the bottom chords are slightly

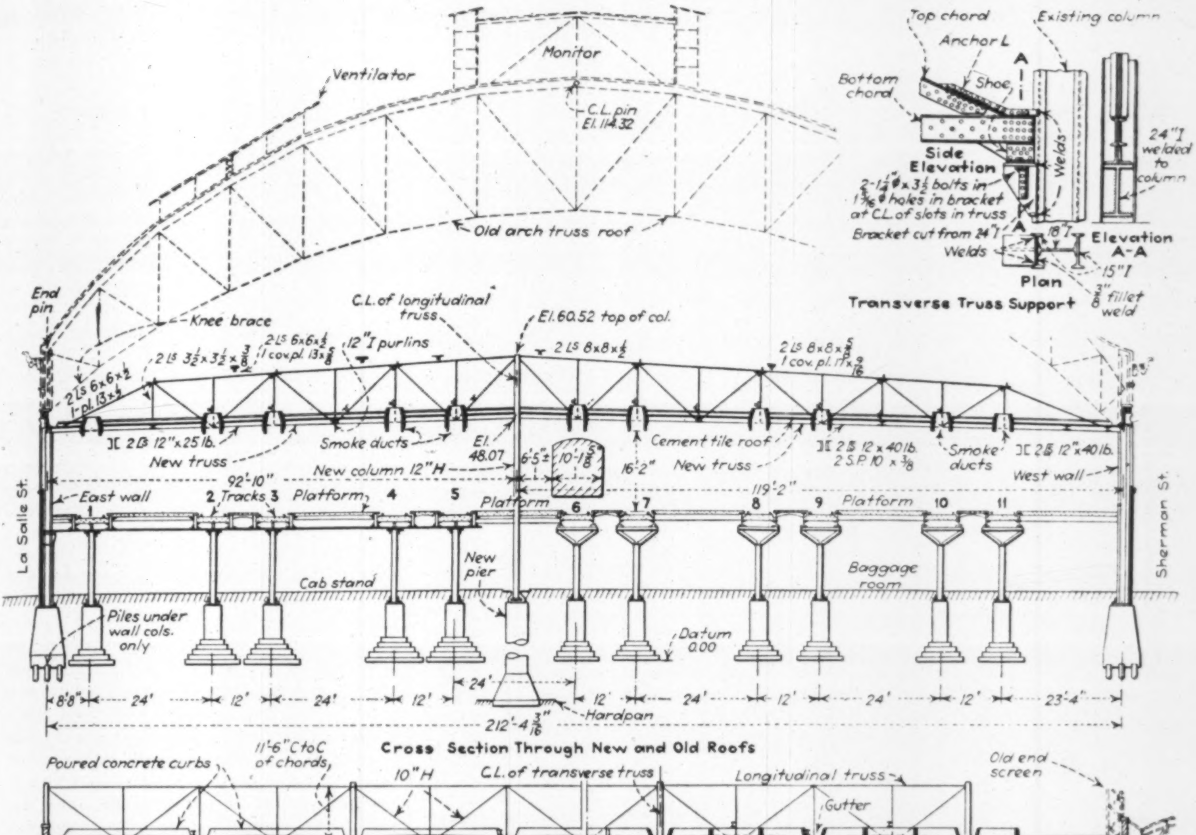

Monitor
Ventilator
C.L. pin El. 114.32
Old arch truss roof
End pin
Knee brace
C.L. of longitudinal truss
El. 60.52 top of col.
2 Ls 6×6×½ 1 pl. 13×¼
2 Ls 3½×3½×⅜
2 Ls 6×6×½ 1 cov. pl. 13×⅝
12" I purlins
2 Ls 8×8×½
2 Ls 8×8×⅝ 1 cov. pl. 17×9/16
2 [s 12"×25 lb.
New truss
Smoke ducts
El. 48.07
6'5"±
10'-1⅝"
Cement tile roof
16'-2"
New column 12" H
2 [s 12×40 lb. 2 S.P. 10×⅜
Smoke ducts
2 [s 12"×40 lb.
West wall
92'-10"
119'-2"
East wall
2 Tracks 3
Platform
4
5
6
7
8
9
10
11
La Salle St.
Sherman St.
New pier
Cab stand
Baggage room
Piles under wall cols. only
Datum 0.00
8'8"
24'
12'
24'
12'
24'
12'
24'
12'
24'
12'
23'-4"
Hardpan
212'-4 3/16"
Cross Section Through New and Old Roofs
Top chord
Existing column
Anchor L
Bottom chord
Shoe
A
Side Elevation
Welds
24" I welded to column
2-1¼" ϕ × 3½ bolts in 1 5/16 ϕ holes in bracket at C.L. of slots in truss
Bracket cut from 24" I
18" I
Elevation A-A
Welds
15" I
Plan
⅜" fillet weld
Transverse Truss Support
Poured concrete curbs
11'-6" C to C of chords
10" H
C.L. of transverse truss
Longitudinal truss
Old end screen
Gutter
Head wall
Concrete tile roof
10" H
Electric lights
Wall of smoke duct
Reinforcing truss in smoke-duct wall
Diaphragms in smoke duct
12" H col.
Track bumper
Concourse
12" H col.
12" H col.
Platform
Platform
El. top of rail 29.5±
Harrison St. subway
Section Through Platform
Section Through Track and Smoke Duct
South wall
Footings of old columns of trainshed floor
New pier No. 1
Pier No. 19
Col. No. 18
Old col. No. 2
30'-3⅛"
30'-3⅛"
30'-3⅛"
30'-3⅛"
29'-4½"
Part Longitudinal Section, New Roof
Roof tile
Roof
2 pl. ⅜×9"
2 shelf Ls 3×3
Section B-B
12" H col.
Curved to conform to camber of purlins
10" H
B
B
10" H
2-9×⅜ Pls. 2-3"×¼" fills
15'-1 9/16"
C.L. transverse truss
Part Bottom Chord - Longitudinal Truss
Transverse trusses
Longitunal truss
Col.
Smoke ducts
Col.
Trusses in smoke-duct walls
Purlin
Note - All purlins cambered 5 in. in 30 ft
Purlins
30'-3 3/16"
30'-3 3/16"
Framing at Bottom Chord
Framing at Top Chord
Part Roof Framing

FIG. 2—DETAILS of new flat roof built beneath old arch trusses of LaSalle St. Station, Chicago.

inclined and the top chords still more inclined, to give a drainage slope to each side of the roof. In the first panel next to the wall the top chord becomes an end post, seated on the bottom chord, which extends beyond this connection. This feature of the design was adopted in order to keep the wall-column connection below the end connection of the old arch truss and also to give a convenient connection with the column.

Longitudinal starred-angle struts are fitted between the top chords in all panel points. Horizontal diagonal bracing is framed between these chords in four of the eighteen transverse bays: the two end bays and the sixth bay from each end. Some of the longitudinal struts come directly over the smoke ducts, and at some later time these may be protected by concrete casing. The typical arrangement of the roof framing is shown in Fig. 2.

Typical make-up of the transverse

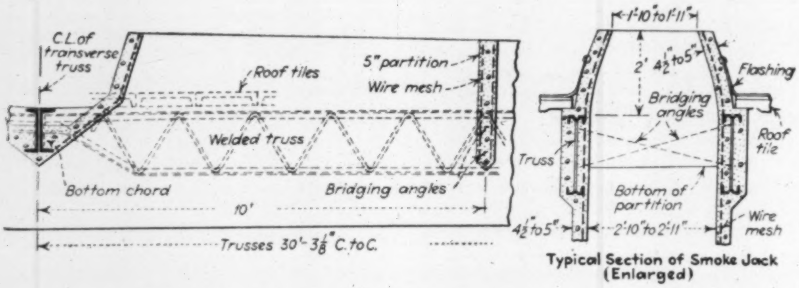


FIG. 3—SMOKE-DUCT DETAILS. Construction consists of welded trusses encased in light-weight concrete.

trusses includes a T-section top chord and end posts of two angles with coverplate; a bottom chord of two 12-in. channels and web members of pairs of angles. The differences between the 120-ft. (nine-panel) and 92-ft. (seven-panel) trusses are in the weight and section of the members. Between the trusses the steel framing consists mainly of purlins spaced 36 ft. c. to c., except that in the north bay the spacing is 8 to 10 ft. Each purlin is composed of a 12-in. H-beam with 9x$\frac{3}{8}$-in. top plate, framed between the bottom chords of the trusses. These purlins are cambered 4 to 5 in. in their span of 30 ft. 3 in., thus forming a series of longitudinal ridges and valleys, while the roof itself has a slight slope for drainage from the center line to each side.

The roof is designed for a live load (snow) of 25 lb. per square foot. Dead load includes the following: 268 or 215 lb. per lin.-ft. of truss for the trusses and bracing on the west and east spans respectively; 100 lb. per cu.ft. for light-weight (Haydite) concrete in smoke ducts and curbs; 15 or 18 lb. per sq.ft. for precast concrete roof slabs.

Columns and interior exposed steel parts are painted with an aluminum finishing coat, while the concrete slabs and ducts are left in their natural color. Exposed exterior steelwork of the trusses and bracing above the roof slab (which is carried by the bottom chords) is given a finishing coat of weather-resisting paint.

Welded supports for trusses

As the brackets to carry the new trusses had to be attached to the inner faces of the existing wall columns, a welded connection was devised, as noted above (shown in Fig. 2), as it was found impracticable to make a satisfactory riveted connection. The bracket, cut from a 24-in. I-beam, was welded to the column with a $\frac{3}{8}$-in. continuous weld. Its top flange, fitting between the flanges of the 15-in. I-beam that forms the face of the column, was welded to each of these flanges by a solid weld $\frac{7}{8}$ in. deep and 2$\frac{1}{2}$ in. long, while a fillet weld was formed at the top and bottom of the bracket, attaching it to the web of the 15-in. I-beam. Severe tests on some of these brackets showed very high strength of their welded connections. The truss shoe is bolted to the bracket, and an agle tiebar riveted to the truss is welded to the column, in order to give stability to the latter when the old arch trusses are removed.

Concrete smoke ducts

Over each track the roof has a longitudinal smoke duct or smoke jack (Fig. 3) for the escape of steam, smoke and gasses from the engines. To give a good draft and prevent escape of smoke under the roof, each duct is formed with deep side slabs which come down to within a few inches of the stacks of the largest engines and are drawn inward at the top. The depth is from 3 ft. 3 in. to 6 ft. 3 in. owing to the lateral slope of the roof to each side and the longitudinal grade of the tracks toward the headhouse. There is a uniform clear width of 2 ft. 10 in., which above the roof slab tapers to 1 ft. 10 in. The walls or side slabs are of light-weight concrete 1:2$\frac{1}{2}$:2$\frac{1}{2}$ mix, made with high-early-strength cement, Haydite (burned clay), fine and coarse aggregate, and are reinforced with welded wire netting and light welded trusses.

Where the bottom chords of the transverse trusses cross the smoke duct, the steel is cased in concrete, forming a V-rib whose sides are protected from the engine blast by $\frac{3}{8}$-in. cast-iron plates, anchored into the concrete. The upper part of this rib also forms a drainage gutter. In addition, the sides of the duct are braced by two 5-in. vertical reinforced-concrete partitions or diaphragms in each 30-ft. span between trusses, the bottom of the diaphragm being brought to a V-shape and protected by a casting. Each diaphragm is reinforced by a steel X-brace of light angles connecting the smoke-duct trusses. At a point where a crossover occurs in the track, the bottoms of the adjacent side slabs of the ducts are connected by a concrete slab sloped to guide the gases into the ducts.

Roof covering

Upon the rows of 12-in. purlins and the smoke-duct walls are laid concrete tiles of channel section, 18 in. wide and mainly of 8-and 10-ft. span, jointed with asphaltic cement. Over the slabs is a layer of tarpaper and then a 1-in. layer of insulating material covered with a waterproof roofing of felt mopped with pitch and sprinkled with fine gravel. As noted already, the purlins are cambered to form shallow ridges and valleys for drainage, and a poured concrete rib or curb is formed along each transverse truss. In the valleys are grated openings and drains connected to the old down-spouts at the wall columns, expansion joints in the pipes providing for vertical movements in the roofs or piping.

In the longitudinal truss the H-beam of the bottom chord has riveted side plates extending above it to form a trough, which is filled with concrete to

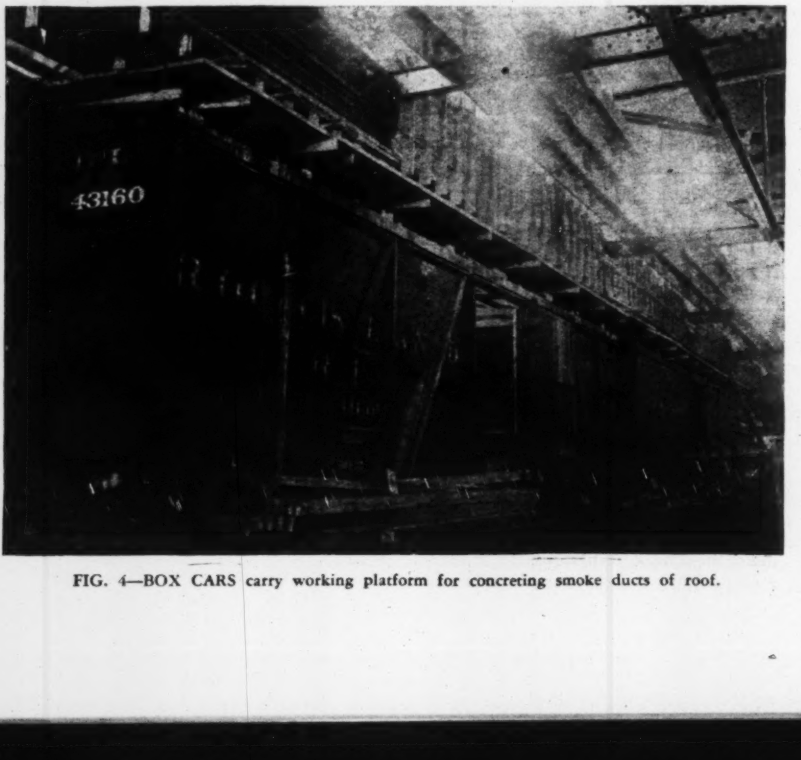


FIG. 4—BOX CARS carry working platform for concreting smoke ducts of roof.

form a curb or ridge along the middle of the roof. Shelf angles on these plates support the ends of the roof tiles. In the transverse trusses the tiles are laid against the bottom-chord curbs, and at the smoke ducts they are seated on shelves formed in the concrete.

Roof skylights omitted

An unusual feature of this trainshed is the entire absence of skylighs. Many low-roof trainsheds have skylights in the flat areas over the platforms, supplemented sometimes by triangular monitors over the rows of platform columns, to provide both light and ventilation. Obviously, the efficiency of the skylights depends upon their size and the frequency and care with which they are cleaned of soot and dirt. For the LaSalle St. Station, skylights were omitted on account of the limited and variable light thus obtained, and particularly to avoid the continual maintenance expense for cleaning and for repairing.

Electric lighting will be used, therefore, by day and night, although on clear days it may not be needed at the south end of the trainshed. Over each platform is a central row of 200-watt lamps, two in each 30-ft. bay and at a height of 15 ft. This arrangement was adopted, after numerous experiments, as giving ample and well-diffused light on the platform while keeping the lamps out of the range of vision of the enginemen. A red light near the end of each row of lamps indicates the "dead line" at which all engines must stop.

The lights are arranged in groups, controlled from a switchboard in the station master's office, so that illumination will be provided only where needed for the handling of passengers and baggage. With this system of control, it is expected that even with numerous and powerful lamps, the total wattage consumption of electric current will be less than under the old system, which combined daylight with electric lighting.

Erection methods

After the foundation piers had been completed, the new columns were brought in on flat cars and lowered into place, through the holes cut in the platform, by means of a derrick car on the track. The roof trusses, completely assembled, were also brought in on flat cars and erected by a derrick car. This work for the transverse trusses was done at night, when all the tracks on one side of the station could be closed to traffic. An average of three spans was placed each night.

For concreting the smoke ducts, plywood forms were hung from the steel framing, forms for two ducts on the entire length of the roof being placed at one time. Forms and reinforcing steel were placed from working platforms on the roof of box cars, as shown in Fig. 4. A concreting train was installed, with a ¾-yd. mixer discharging into a portable hopper for loading wheelbarrows, which were raised by an elevator to runways above the roof. Owing to the thinness of the vertical slabs, electric vibrators were operated against the forms, to insure denseness of the concrete, which was also rodded to prevent voids. As this was winter work, between December and April, the materials were heated so that the concrete as discharged was at about 80 degrees F., and in the forms it was maintained at about 50 to 60 deg. by means of steam jets under canvas covers.

Both the poured concrete and the concrete tiles were placed in longitudinal sections for the entire length of the station, generally covering two tracks and a platform, which were put out of service during the work. Ordinarily suburban traffic is handled on the east side of the station, but during the construction period the traffic was rearranged from time to time as required. The entire roof was completed in May, 1934.

Preparation and study of alternative plans and estimates, together with selection of the adopted design, were carried on jointly by the engineers of the two railways owning the station, but under the personal direction of I. L. Simmons, bridge engineer of the Chicago, Rock Island & Pacific Railroad, and B. R. Leffler, bridge engineer of the New York Central Lines. All details and the construction work were left in the hands of the Rock Island engineers, under Mr. Simmons, with T. C. Frederick as engineer of design, H. L. Bober, engineer of construction, and A. T. Hawk, architect. The general contractor was the Ellington-Miller Co., Chicago. Including materials, foundations, erection and the dismantling of the old roof, the total cost for the new construction was about $290,000.

Safe Travel on Highways the Engineer's Obligation

Review of highway accident frequency and hazard—Statement of the engineer's responsibility for safety and of the agencies by which it may be exercised

By Harry Tucker

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About 30,000 persons are killed each year in the United States in motor-vehicle accidents, and nearly 1,000,000 people injured. The property and economic loss due to these accidents is estimated to be nearly $2,000,000,000 yearly. The number of such accidents has increased steadily since the invention and wide use of motor vehicles, though the number of accidents per 100,000 vehicles registered has decreased.

In Washington there was held, from May 23 through May 25, the fourth convention of the National Conference on Street and Highway Safety. In preparation for the convention, the director of the conference issued a bulletin on "Guides to Highway Safety." It is significant that one of the major divisions of this bulletin covered engineering in its relation to the prevention of traffic accidents. This serves to emphasize the fact, well known to students of accident statistics, that the prevention of motor-vehicle accidents in many ways is an engineering problem, and one to be solved by engineers.

Traffic regulation on the streets and highways is complicated by the presence, to a great extent, of the personal element. There is always the difficulty of controlling the actions of pedestrians and drivers in such a manner that accidents will be avoided. Because of this fact, it might be considered that the functions of engineers in the prevention of traffic accidents are somewhat limited. But, as a matter of fact, a careful study of the recommended methods of traffic regulation and control will disclose many fields of activities for engineers in this useful work.

It is the purpose of this article, therefore, to point out some of the numerous ways in which engineers can assist in the prevention of highway accidents. The accompanying diagram indicates graphically some of the possibilities. And it is believed that, since the engineers by training and experience are logically the people to initiate and supervise methods of preventing motor-vehicle accidents, that here is a task, if not a duty, which they must assume.

The four major contributing causes of motor-vehicle accidents are: defective vehicles, location of or defects in streets and highways, pedestrians and the drivers. Any method, then, for reducing traffic accidents must be directed toward the elimination of defective vehicles, the building of safer highways and streets, providing adequate protection for pedestrians and toward controlling the drivers of all motor vehicles.

In order to insure that only mechanically perfect vehicles shall operate over the highways, it is first necessary that they be properly designed and built. It is an error to assume that all cars come from the factory actually free from defects. When mass production methods are employed in manufacturing vehicles, it is to be expected that some of them will not be perfect. But it is to the credit of motor-car builders that they quickly adopt principles of design, as well as accessories, which will insure a vehicle safe to use. And the accidents caused by defective vehicles are due, in the great majority of cases, to neglect on the part of the owners.

That is, though cars may be well built, they need attention periodically if they are to be kept in good mechanical condition. And here is the second thing needed if accidents due to defective vehicles are to be reduced; there must be a law requiring the periodic inspection of all motor vehicles, and those defective must be kept off the highways until they are put in proper condition.

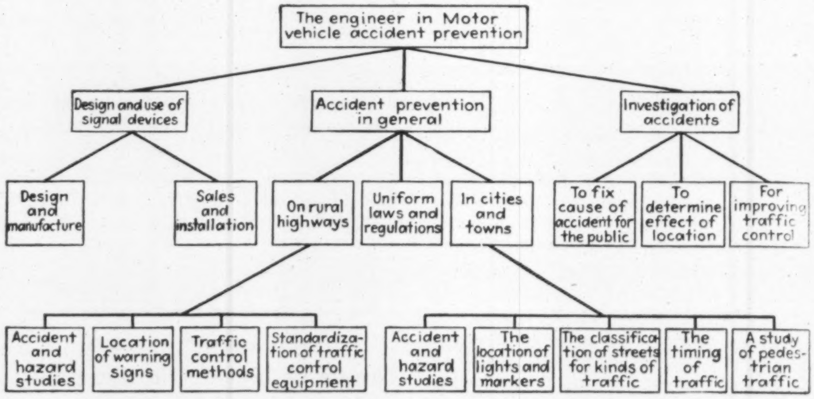
In a general way, then, engineers can aid in preventing motor-vehicle accidents through the development and investigation of materials, by designing vehicles that will be structurally sound and by the development of accessories that will make cars safer to use under the most strenuous conditions. In addition, they can take a most active part in securing suitable legislation requiring the periodic inspection of all motor vehicles. And in the event that such laws are passed, the engineers are certainly best fitted to supervise the enforcement of the requirements, if not actually to make the inspections.

It is doubtful if the design of streets and highways has kept pace with the development and wise use of motor vehicles. Certainly the future needs of highway traffic have not always been anticipated by road administrative bodies. This may, perhaps, account for the fact that the location of and defects in streets and highways are contributing factors in about 30 per cent of all fatal accidents.

It is believed that the time has come when highways should be located and designed with primary consideration being given to the safe operation of vehicles over them. This has not always been done heretofore, for a saving in first cost on grading has more often influenced the choice of location. Thus, it is found on many highways that improper location with sharp curves and steep grades, both necessitating short sight distances, are important causes of accidents.

Likewise, the design of the sections should be undertaken with proper consideration given to the safe operation of vehicles. This has particular reference to width of pavements and shoulders, the location and depth of ditches and to the materials out of which the shoulders are built. Modern pavements should be widened and superelevated on the curves. And it is desirable, from considerations of safety, that there be a blending between the pavement and the materials out of which the shoulders are built, especially for one-lane and narrow two-lane pavements.

In both streets and highways there is always the problem of providing safe intersections. It has been found that about 45 per cent of all motor-vehicle accidents occur at these points. Right-angled intersections are desirable, and there should be a clear view of approaching traffic for a reasonable distance from each of the pavements. The intersections should be designed so that traffic can turn from one lane into a connecting lane with a minimum of danger.


The engineer in Motor vehicle accident prevention
Design and use of signal devices
Accident prevention in general
Investigation of accidents
Design and manufacture
Sales and installation
On rural highways
Uniform laws and regulations
In cities and towns
To fix cause of accident for the public
To determine effect of location
For improving traffic control
Accident and hazard studies
Location of warning signs
Traffic control methods
Standardization of traffic control equipment
Accident and hazard studies
The location of lights and markers
The classification of streets for kinds of traffic
The timing of traffic
A study of pedestrian traffic

SCHEMATIC CHART indicating relation of the engineer to accident prevention on highways.

The maintenance of highways has an important influence on accidents. Poor conditions of the shoulders contribute greatly to traffic accidents. These are often narrow and are of a material that is unstable in wet weather. There is a tendency for ruts to form at the edges of the pavement, and this contributes to accidents when a vehicle is forced off the road.

There are two items of maintenance that should receive careful consideration. One is the marking of the pavements into traffic lanes; the other is the illumination of heavily traveled roads. It is believed that the suitable marking of center lines and traffic lanes, coupled with the enforcement of traffic regulations requiring vehicles to drive in the proper lanes, will have the effect of materially reducing traffic accidents. The proper illumination of highways has been studied at length by engineers during recent years. When efficient methods are devised for this purpose, night driving will be made safer, with a consequent increase in traffic capacity for a 24-hour period.

The highways and streets are built by engineers. They, therefore, have a direct part in so building them that they will be safe under normal use. It is true that a large percentage of all accidents happen on straight roads with surfaces in good conditions. This fact, however, does not minimize the value of having the road well designed, substantially built and properly maintained. If traffic hazards on roads were eliminated, there would be one less major cause of motor-vehicle accidents.

The control of the pedestrian using streets and highways is one of the major problems of regulating highway traffic. The problem can be definitely solved by prohibiting pedestrians from using the traveled ways of highways and streets. In order to do this, however, sidewalks must be provided for their use. This can be done on streets and certain roads; it is obviously impracticable for all highways. It is believed that highway engineers should give more thought to this problem. It should be possible for inexpensive pathways to be built along many of the heavily traveled roads.

Cross-over pedestrian traffic can be taken care of through subways and overpasses. Again, this is impracticable for the majority of the intersections. In cities certain control methods will help in preventing accidents due to pedestrian cross-over traffic. In rural sections there seems to be no practical way of relieving the situation.

Engineers can do most effective work in solving the problem of the pedestrian. Highway engineers, in particular, should collect traffic data and, from a study of this, recommend those sections of highway that should be provided with sidewalks. They can further study and design types of walks that would be attractive and inexpensive. In cities the same traffic studies would be useful in determining where either automatic or manual control of pedestrian traffic is desirable.

The drivers of motor vehicles are largely responsible for accidents. Proper education, suitable licensing methods and strict control are the means which must be adopted in order to decrease motor-vehicle accidents. Engineers can have a part in this work in numerous ways. Study of traffic accidents will enable them to suggest educational programs; they should be the ones who devise methods of examining the applicants for license as drivers; and they should be the logical persons to devise and enforce methods of driver control.

It is believed that engineers can take a most important part in preventing motor-vehicle accidents by devising regulations and methods for the safe and efficient control of street and highway traffic. In most cities they have little to do with this work, it being usually considered that the regulation of traffic is one of the functions of police departments. As a result, there are traffic regulations in force which are antiquated, inefficient and which are not only useless in preventing accidents but may actually, if rigidly enforced, contribute to accidents. Most cities need and should create traffic bureaus; and since the control of traffic is so largely an engineering problem, the heads of such bureaus should most certainly be engineers.

Through traffic bureaus a thorough study should be made of the accident situation in each city. The place and time of occurrence of accidents are vital factors in the methods adopted for traffic control. This information should be spotted on large-scale maps, and, together with data on pavement types, pedestrian traffic, sidewalk facilities, playgrounds available, obstructions to vision at intersections, will serve to determine the character of general regulations needed, as well as the specific methods of traffic control to be adopted at a particular intersection or cross-over. With a study of accident data, therefore, made by engineers thoroughly familiar with methods of regulating traffic, sensible and efficient traffic ordinances can be enacted. And, finally, the dangerous traffic hazards for both motor and pedestrian traffic along the city streets can be eliminated or properly protected with signals and personnel.

Traffic regulations

What has been said about the regulation of traffic in cities applies with just as equal force to the regulation of traffic on the highways. It is believed that each state highway commission should have a traffic bureau with an experienced and capable engineer at its head. Data on accidents should be collected by the bureau, and a study made of those sections of highways where accidents occur. By doing this it would be possible, as normal construction and maintenance of the highways permit, for many traffic hazards to be eliminated.

One major task of a traffic bureau would concern signal equipment. A study of traffic and accident data would serve to determine streets and intersections where signal equipment should be installed. There are various types available. These should be investigated thoroughly, and that type selected which would aid most efficiently in the safe handling of traffic. Another problem would concern the proper timing of signals so that through-traffic will be routed with a minimum of delay. All of these are engineering problems, and they can be solved in the most efficient manner through having capable engineers in the traffic bureau.

While the actions of the drivers of motor vehicles at the times of accidents cannot be controlled, it is possible, through suitable laws and regulations, to prevent careless and reckless drivers from having the opportunity to cause other accidents. This means that it is desirable that every street and highway accident be thoroughly investigated and criminal responsibility for the accident be definitely fixed. This duty should be delegated to the traffic bureau, which, in turn, should have an officer or a division assigned to investigate all motor-vehicle accidents occurring within the jurisdiction of the city. If this work is done efficiently and impartially, it would have a most important influence in bringing about a decrease in motor-vehicle accidents. In this important task it is obvious that engineers, if given the opportunity, can do a most useful work.

Educational methods

Lastly, highway accidents can be prevented in some measure through educating motorists and pedestrians alike in traffic rules and regulations, giving warning at the same time of dangerous practices and advising the proper and safe methods of using the streets and highways. While engineers as a class do not seem to be especially gifted as speakers, they are, nevertheless, trained to analyze data in a clear manner, to devise methods to relieve unsatisfactory conditions, and they are capable of planning orderly procedure. They can, therefore, assist greatly in organizing educational campaigns, in the preparation of accident data and charts; and many of them, it will be found, could make forceful speeches on accident prevention before interested groups.

Engineers design and build the highways and streets; they take an important part in the manufacture of the vehicles that travel over them. Engineers have, therefore, a direct responsibility in seeing that the use of motor vehicles shall be *safe* as well as convenient, and this responsibility cannot be dismissed lightly or delegated to others. Likewise, in those phases of accident prevention which are more directly concerned with the personal element, the engineers are best qualified to render efficient service. It is clear, then, that there are many opportunities for engineers to utilize their training, experience and vocational duties in the prevention of motor-vehicle accidents. Here is a fruitful field for effort; and there is no type of work just now more worthy of unselfish service.

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Drought Problems of the Arid West

IN A RECENT STATEMENT relating to the drought, Elwood Mead, commissioner of reclamation, presented some significant facts on the general problems of reclamation policy. The most serious problems of the drought of 1934 are found in the western third of the country, where the normal rainfall is 20 in. or less. Farther east, where the average rainfall is 30 in. or more, there is reason to believe that next year abundant crops will mature, but in the marginal land drought is always hovering on the horizon.

When the Reclamation Act was before Congress, the general idea of the country was that this was a measure to build canals over great stretches of unpeopled sagebrush land and so increase the cultivated and taxable area of the country. In actual operation something entirely different has taken place. From the outset the Reclamation Act has been a rescue agency. Dr. Mead recalled that on many of the most important rivers the immediate and pressing need was not for canals to water new lands but for water to take care of farms already under cultivation. As a result, the Bureau of Reclamation became a great reservoir builder. It has built 85 dams and is now engaged in the construction of six more.

In all, the government has built canals and reservoirs to irrigate the land on 27 projects. This year, with rivers a shadow of their average flow, on 17 of these 27 projects there is ample water supply. On the ten others there is some shortage but no distress.

There are areas that have a reserve water supply where the farms are suffering for storage to make it available. Upper Snake River is a conspicuous example of this. There are other areas where great caution must be observed in making future expansion. On the North Platte River the Pathfinder Dam was filled to less than half its capacity in 1933, in 1921 to one-half, and in 1929 it ran over the spillway. On the Lehontan Reservoir on the Carson River, water has flowed over the spillway only once since it was completed. On the Elephant Butte Dam on the Rio Grande it has never run under the spillway. On these rivers, said Dr. Mead, "We can assume that the building of reservoirs has probably ended and the limits of expansion have about been reached."

New Concrete Paving Methods on Pompton Turnpike

Exceptional use of new equipment models includes dual-drum mixer and gasoline-electric finishing machine—job also featured trial of internal vibration, cocoa curing blankets and devices for installing new type of expansion joint

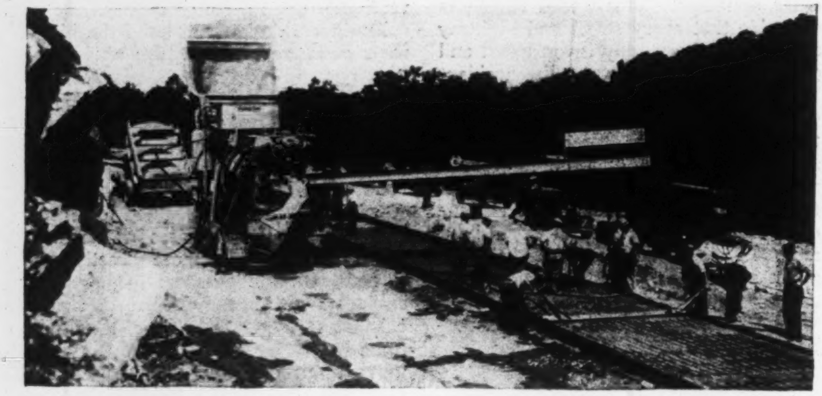


FIG. 1—DUAL-DRUM PAVER mixes concrete in two stages for Pompton Turnpike, concreting one 10-ft. lane at a time of twin two-lane pavements separated by grass strip and shoulders.

METHODS of pavement construction new in several particulars are being employed on the contract for $4\frac{1}{2}$ miles of the Pompton Turnpike described in *Engineering News-Record* of Sept. 6, 1934, p. 305. This New Jersey trunk road consists of two two-lane concrete pavements separated by a 16-ft. grass strip with two 2-ft. stabilized stone shoulders. With a 10-ft. outside stone shoulder on each side the total width of the roadway is 80 ft. Structurally the concrete pavements are of principal interest because of the new joint construction described in the article noted above.

The novelties in construction methods, besides the joint installation, are the use of a dual-drum paving mixer and a gasoline-electric finishing machine; vibration of the slab concrete; curing with a rubber-covered wet cocoa mat blanket, and marking traffic lanes by dusting onto the fresh concrete a ribbon of white cement.

Concreting methods

Each two-lane (20-ft.) unit of pavement is constructed in two strips (one 10-ft. slab at a time) using a $1:1\frac{3}{4}:3.42$ concrete mixture in batches of 7 bags of cement, 1,236 lb. of sand, 1,164 lb. of $\frac{3}{4}$-in. stone, 1,164 lb. of $1\frac{1}{2}$-in. stone and from 28 to 29 gal. of water. In this year's concrete-road specifications the time of mixing is not fixed, but the materials are required "to be in motion in the mixing drum for a period of time equal to 35 revolutions." It is considered that, with the greater mixing efficiency of the newer paving mixers, a more logical gage of satisfactory concrete is the number of mixer revolutions instead of minutes of mixing. In the work being described the speed of the dual-drum mixer is 20 r.p.m. Each batch receives 17 revolutions in the first drum and 20 in the second drum, the two revolutions more than the minimum specified being allowed for transfer of the batch from the first to the second drum. At 20 r.p.m. speed and a total of 37 revolutions the batch is in the mixer 1 min. $3\frac{1}{2}$ sec.

Dual-Drum Mixer—To increase concrete production, the contractor installed a dual-drum paving mixer to be serviced from a central aggregate-proportioning plant by a fleet of four-batch trucks, cement being added at the mixer. The aggregate plant was located on a railway siding at Bloomingdale, giving a maximum haul to the mixer of about $2\frac{1}{2}$ miles. The mixer has two 27E drums set tandem, with the opening between them equipped with a power-operated discharge chute to pass the concrete from the first to the second drum. As operated, the paver has four batches in process at the same time; a batch in the charging hopper, a batch in each drum and a batch in the bucket being delivered to the slab. A view of the mixer in operation is shown by Fig. 1; it is a standard machine operated by a six-cylinder gasoline engine and having a 25-ft. delivery boom.

The mixing period has been discussed. In general, familiar procedure is followed in pouring the slab. The poured concrete is spread by shovels and struck off by hand screed to an elevation 2 in. below the pavement grade for placing the reinforcement. When laid, the steel mats are tamped down smooth by a plow-handled screed operated by two men. The covering concrete is then poured and placed by finishing machine and vibrators.

Machine Finishing — The finishing process is normal, but the machine is a new unit in which a gasoline engine drives an electric generator, which supplies power to motors for propelling the machine and for operating the screeds. Fig. 2 shows the machine in operation. In general, the machine has the usual two screeds and the finishing belt. In detail the 14-in. wheels have roller bear-

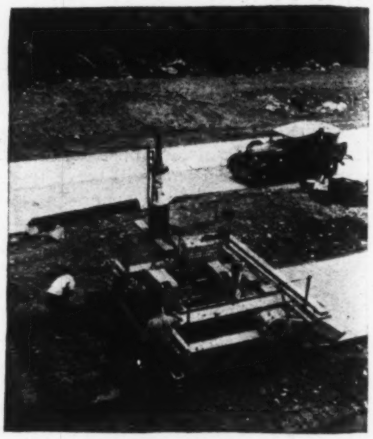


FIG. 2—FINISHING MACHINE operated by gasoline-electric power plant integral with the machine and operating two screeds and a belt.

FIG. 3—INTERNAL VIBRATOR being operated along forms and transverse joints and at 2-ft. intervals in body of slab.

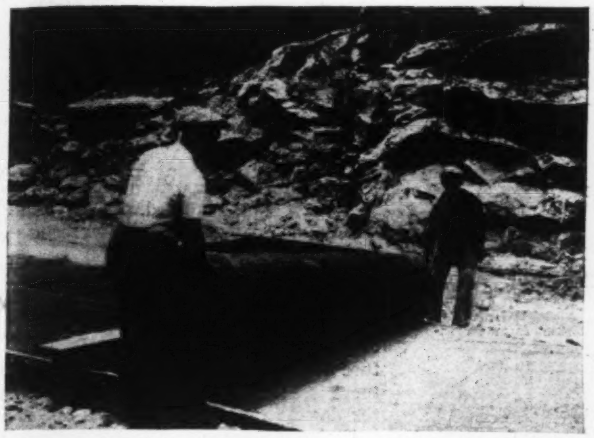


FIG. 4—COCOA CURING MAT being unrolled on concrete slab preparatory to wetting and covering with rubber blanket.

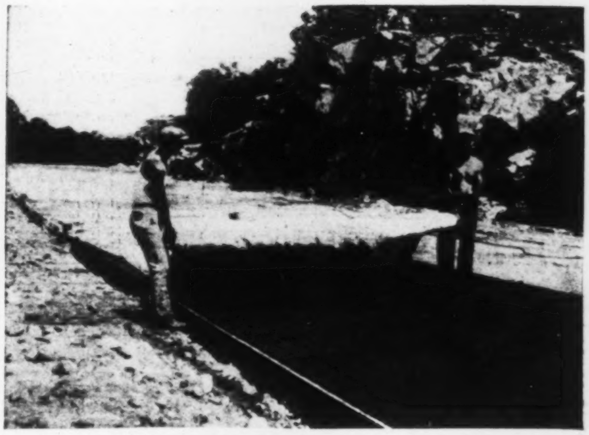


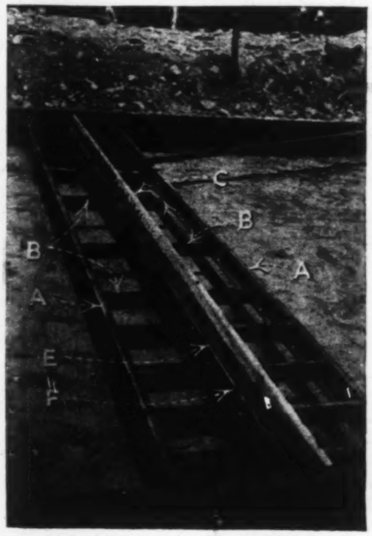
FIG. 5—RUBBER BLANKET covers wet cocoa curing mat and prevents evaporation of water; blanket left in place 48 to 72 hours.

ings and are all drive wheels, both ahead and in reverse, with propelling speeds of 7, 14, 33 and 66 ft. a minute. The screeds have shock absorbers and can be equipped for vibration. A connection is provided for lighting at night, and four integral screw jacks are provided for screed adjustment, wheel changes or derailment.

Electric-power operation is the distinctive feature. Its advantages are ease of operation through finger-touch control, greater range of propelling speeds and greater torque for handling dry concrete or meeting other peak calls for power while still maintaining smooth travel. On the work being described, the machine goes over the slab twice on level stretches, using the belt on the second pass; on grades three passes are made. Following the finisher the slab is smoothed with a long-handled wood float and is then belted and broomed.

Vibration—Instead of the usual practice of vibrating the whole slab with screed or surface vibrators, the experiment was made on this operation of using internal or spud vibrators along the joints and at about 2-ft. intervals in the slab. The spud vibrator, as shown by Fig. 3, resembled and was handled much like a jackhammer drill, the operating spud being a 3-in. metal disk. The frequency of vibration was 3,500 a minute. The vibrator was air-operated at 80-lb. pressure by a portable compressor of 110-cu.ft. capacity, which is sufficient for two vibrators. After trial the spud vibrators were discontinued, and surface vibrators were substituted with hand spading along the forms.

FIG. 6—EXPANSION JOINT assembled, ready for pouring concrete; clamps on side forms hold joint rigidly to line and elevation.



Traffic Stripes—The edges of the 10-ft.-wide paved slabs are marked by integral traffic stripes formed by dusting a film of white cement upon a 6-in.-wide band of the newly concreted pavement, using 0.2 lb. of cement per linear foot. Immediately after it has been applied, the white cement stripe is painted with white cement grout.

Concrete Production—The contractor is working two gangs each, three 10-hour days a week. Building 10-ft.x9-in. uniform depth slabs the best continuous days' runs have been somewhat over 1,300 sq.yd. The concreting crew consists of 20 men, not including the curing that is done under subcontract.

Curing of the slab has the unusual feature of being done by subcontract and is a notably elaborate development of the wet-blanket method that has recently gained increased favor because of its neatness, economy of labor and simple procedure. On this contract the main curing blanket is a thick cocoa mat which, as shown by Fig. 4, is unrolled like a rug to cover the slab. The matting is handed in 40-ft. rolls. When laid, it is saturated with water by a hose and then covered to prevent evaporation by rubber sheeting, as shown by Fig. 5. The blanketing remains in place from 48 to 72 hours and is then rolled up and carried ahead by motor truck for re-use on the newly finished slab.

Joint installation

The joint design and structure were described in detail in *Engineering News-Record*, Sept. 6, 1934, p. 305. In

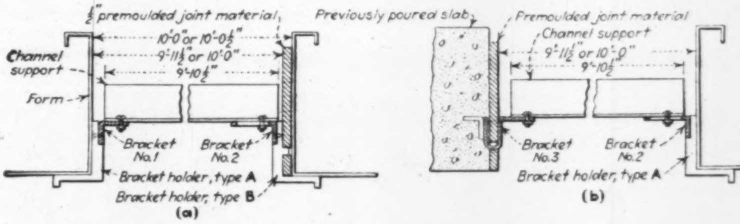

½" premoulded joint material
10'-0" or 10'-0½"
9'-11½" or 10'-0"
9'-10½"
Channel support
Form
Bracket No.1
Bracket No.2
Bracket holder, type A
Bracket holder, type B
(a)
Previously poured slab
Premoulded joint material
Channel support
9'-11½" or 10'-0"
9'-10½"
Bracket No.3
Bracket No.2
Bracket holder, type A
(b)

FIG. 7—BRACKET ARRANGEMENT for holding expansion joint in place between slab forms.

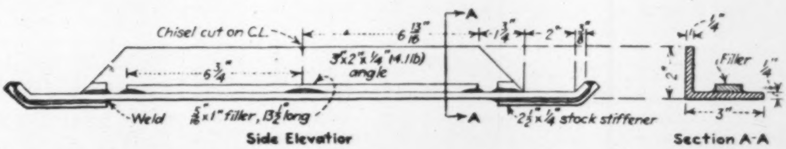

Chisel cut on C.L.
6 13/16"
3"x2"x¼" (4.1lb) angle
6¾"
Weld
5/16"x1" filler, 13½" long
A
A
1¾"
2"
⅜"
2½"x¼" stock stiffener
Side Elevation
¼"
Filler
2"
¼"
3"
Section A-A

FIG. 8—ANGLE SPACER and support for bracket holders and brackets for expansion joints.

general, Fig. 6 gives a clear enough indication of transverse-joint construction for a description of installation procedure. Naturally, the details of operation will vary with the contractor's and engineer's notions of ease and convenience, but in essentials the operations are about as follows: referring (1) to the first slab concreted, Fig. 7a; and (2) to the second slab concreted, Fig. 7b; the two slabs make up a two-lane pavement.

Installation in the first slab (Fig. 7a) begins with the assembly of brackets and bracket holders (four each for each joint to carry the dowel support channels *A* and *A*, Fig. 6) by means of temporary screws. It will be noted that the bracket holders on the joint edge of the slab differ from those on the free or outer edge, by having a projection which engages a hole in the joint filler. The purpose of this is to provide for locating and attaching the joint-side brackets for the second slab (bracket 3, Fig. 7b). With brackets and bracket holders assembled, holes are dug under the forms for the installation of supporting angles (Fig. 8) and the clamps (Fig. 9). These angles are set with the chisel cuts on the line of the joint; their ends carry and locate the bracket holders and brackets. When the whole assembly is complete, the clamps are tightened, holding the angles to position and the brackets to equal spacing and elevation.

The first following step is to attach one channel support (*A*, Fig. 6) to its brackets by stove bolts, with the flanges of the channel facing the joint. The premolded joint material is then set on the line of the joint, and the uncoated ends of the channel dowels are pushed through the punched holes in the filler and into the notches (or between the prongs) of the channel support already assembled. A cushion of oiled corrugated paper is inserted in the other channel support, which is then slipped over the projecting coated ends of the dowels and is attached to its brackets by the stove bolts.

The U-shaped flashing is then placed over the premolded joint material, resting on the dowels and under the two upper bearing angles, as shown by Fig. 10. The two lower bearing angles are laid on the subgrade on each side of the premolded joint material, ready for clipping together with the upper angles, but are not clipped together until after the next operation, which is to cut, lap and install two lengths of longitudinal waterproofing flashing at the transverse joint. This is done prior to clipping together the angles of the transverse joint to allow clearance to be obtained for the longitudinal waterproofing strip, or flashing, by sliding the transverse waterproofing strip and angles a small amount away from the longitudinal joint material. The angles are then clipped together, using an angle clamp or wrench. The protection cap shown by Fig. 11 is then placed over the transverse waterproofing strip and allowed to remain in place until after the last trip of the finishing machine. The transverse joint is then finished in the usual manner by a double-edged finishing tool.

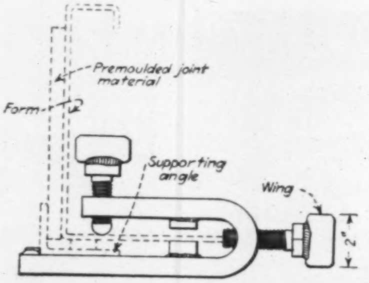


FIG. 9—CLAMP for holding angle, bracket holder and bracket to side form in installing joint.

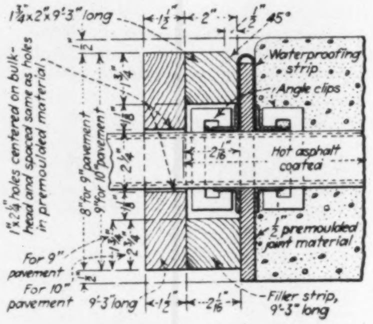


FIG. 10—BULKHEAD set for installing expansion joint at end of day's work.

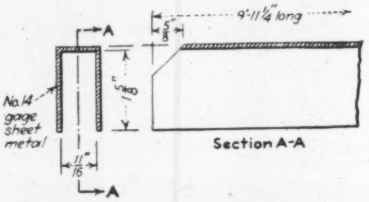


FIG. 11—PROTECTION CAP for joint flashing removed after slab concreting is finished.

Before concrete is placed around the joint it is recommended that the supporting angles, bracket holders and the projecting ends of the screws be given a coating of heavy oil or grease to afford easy removal. After the concrete has attained sufficient hardness to prevent disturbance of the joint, the form clamp is loosened and removed for use at other joints. After the clamps and forms are removed, the supporting angle is removed by excavating a small amount of earth from beneath it. The bracket holders are removed by unscrewing the screws that attach them to the brackets, the brackets remaining in the concrete.

When constructing a lane immediately adjacent to a lane previously constructed, brackets (No. 3) are attached to the brackets that have been allowed to remain in the existing lane, and brackets (No. 2) are used at the form, as shown in Fig. 7b. The assembly of the longitudinal joint is accomplished simply by installing one part of the two-part flashing in the slab being concreted and the other part in the adjacent slab when it is concreted.

Some intricacy of installation seems to be indicated by the description, but the operations are really simple and in actual construction the installation is completed rapidly and requires no larger crew than is ordinary. The joint structure once erected is rigid and stays put; there is no constant watching to see that the dowels are not moved from line and level by the spreading and compacting of the concrete. On the Pompton Turnpike work two men place the joints under the supervision of the concreting superintendent.

Personnel

All construction is under the direction of the highway department engineers; W. G. Sloan is state highway engineer. The general contractor is the Union Building & Construction Co., Passaic, N. J. The subcontract for curing is with the Stedfast Rubber Co., Boston, Mass. The general contract price was $362,000.

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Research on Steel Floors

THE American Institute of Steel Construction has endowed a Research Fellowship at Lehigh University, Bethlehem, Pa., which will be extended over a period of two years. The work relates to research on steel-floor construction and involves the design of battledeck floors, made of flat steel plates welded to steel beams, to carry concentrated live loads. During the past several years the American Institute of Steel Construction had the National Bureau of Standards carry on a comprehensive research on battledeck floors, which developed valuable data regarding fireproofing and behavior under distributed loads. The Fellowship at Lehigh University will continue this work and develop it in the particular field of bridge floors.

The investigation is being carried out under Prof. Inge Lyse of the Department of Civil Engineering at Lehigh in consultation with the Technical Research Committee of the American Institute of Steel Construction. The personnel of this committee includes Aubrey Weymouth, Post and McCord, Inc.; Jonathan Jones, McClintic-Marshall Corp.; J. R. Lambert, Phoenix Bridge Co.; Dr. O. E. Hovey, American Bridge Co.; H. G. Balcom, consulting engineer, New York; and F. H. Frankland, of the American Institute of Steel Construction.

Management of Hauling in Construction

Managed hauling both to and on the job often spells the difference between profit and less profit from construction operations

By J. L. Harrison
Senior Highway Engineer,
Bureau of Public Roads, Washington, D. C.

HAULING—that is, the movement of materials to the site of the work and in connection with the execution of the work—is a matter of importance on all types of construction. To a certain extent this importance emanates from the fact that hauling costs are an important part of job costs. However, to an even great extent, the importance of hauling emanates from the fact that the maintenance of construction schedules and therefore the attainment of proper construction costs is so definitely dependent on having materials at hand when they are needed and on having those on the job moved as required by operating conditions. It is this latter phase of hauling rather than the cost of it which offers justification for the consideration of the management of hauling as an important phase of the management of construction operations.

As a general rule the hauling that is done on the job is of more importance from the standpoint of job management than the hauling that is done in connection with the delivery of materials to the job. In the latter case, hauling arrangements are a part of the schedule of materials deliveries; and while, as such, they may be under the direct control of the job management, they are quite as likely to be under the control of those who supply the materials. In either event, as hauling of this nature is closely related to delivery of materials, it is commonly and quite properly considered in connection with scheduling deliveries of materials, and, in practice, become a part of most delivery schedules.

Delivery haulage

Material delivery schedules are a vital part of construction management. Extensive storage on and about the job is a thing of the past. To store materials in quantity before a job starts or even as it proceeds requires an amount of working capital that few contractors possess, and even if the capital structure will permit of it, the returns on capital used in this way are likely to be low. Moreover, rehandling charges tend to absorb any profit that may seem to be obtainable if materials are purchased on this basis, to say nothing of the extra cost likely to be involved in providing for storage and the costs that are involved in waste and spoilage. There is, then, no apparent reason for abandoning the present practice of buying materials under terms which will provide for their delivery at a rate that will harmonize with the rate at which they are to be used, except such reason as may lie in the cost of the construction delays which experience has shown are pretty certain to result from any failure to maintain the delivery schedule. These can be quite expensive, and on this account there still is some tendency to use extensive job storage even where lower costs could be secured without such storage, the obvious reason being that construction delays are so expensive as often to make the job storage of materials seem the lesser of two adverse influences on cost.

This solution of a matter which has so direct a bearing on the cost at which work can be handled and the profit to be obtained from handling it savors of managerial opportunism. Admittedly, it is difficult to prepare a materials' delivery schedule under which materials will always be on hand in adequate quantities under conditions which involve a minimum expenditure for rehandling. It is even more difficult to manage such a schedule. Still the profit from so doing is considerable.

Avoid rehandling

The writer recently had occasion to observe the manner in which the stonework was handled on two large buildings of very similar design which were being erected by two different contractors within a city block of each other. On one of these buildings the stone was lifted from the delivery trucks and placed in position in the walls. On the other job the stone was lifted from the trucks and piled in the yard and on the floors and subsequently was set in place. As far as the writer could tell, after rather carefully timing a number of trucks, as much truck time was used on the second job as on the first. The two methods then yielded substantially the same costs here. But in the equally important field of expense for labor the first method had rather a conspicuous advantage, for it avoided rehandling the stone.

In this particular instance the management of the hauling equipment did not appear as a factor in the difference in the efficiency of the two methods used. However, this is not of importance, for the thought to be emphasized is that the execution of any schedule of materials deliveries, whether or not such deliveries involve hauling, requires definite managerial attention. Doubtless the more efficient manner in which the stonework was handled on the first of these jobs represented a degree of managerial attention to this aspect of the work which generated some additional cost, but the absence of delays and the smoothness with which the work progressed, to say nothing of the absence of rehandling charges, resulted in savings that greatly exceeded this cost.

In short, careful managerial attention to materials' deliveries and to the arrangements for handling, which are part and parcel of such deliveries, is required if the costs that develop in this field are to be kept at a minimum. Without it even the large construction job descends to the level at which popular imagination depicts the local plumber who, by reputation, continually finds it necessary to return to the shop for a wrench or a piece of pipe he forgot to bring with him. Between the job on which careful management brings the right amount of each material to the job at the right time every day, and the absence of such management which keeps someone forever rushing around to find something that is missing, there is a vast gulf that is nowhere more clearly revealed than in the cost sheets for the finished work.

The effective management of hauling to the job requires a clear appreciation of the objectives. These are, first, a rate of delivery which will keep rehandling costs at a minimum and a dependability of service in this field which will avoid construction delays. It should be, and probably is, quite apparent that the introduction of storage means the introduction of rehandling costs. When there is no storage any failure to deliver on schedule introduces construction delays. Both types of expense are avoidable and, if costs are to be kept at a minimum, both must be avoided. But the skill in management involved in reaching this objective is very considerable. As a result, even on large jobs it has been the writer's observation that the results secured fall far short of the results that first-class management can secure at this point. To no small extent the difficulty lies in the fact that if perfect results are to be secured here, the construction organization itself must be so designed and so equipped that some workable delivery schedule will exactly serve construction needs. This is the fact most frequently overlooked.

To illustrate, in the erection of a steel-frame building, it is quite impossible to eliminate storage unless shipping instructions are in detail and are exact. Rail shipments must, then, be handled on a reasonably exact schedule. On the job the construction crew must be so organized and so equipped as to handle the steel at the same rate at which the fabricator is shipping it and the railroads are delivering it. Only when all of these things have been carefully worked out and when the plans for them are being accurately executed can a hauling service be developed that will avoid storage and rehandling.

Hauling separate operation

Hauling on the job presents problems of about this same sort; but here, because there generally is no opportunity for storage, any failure of the hauling units to function correctly results in a loss of production for the job as a whole. In considering the management of hauling on the job, it always is well to think of hauling as an undertaking wholly distinct from the rest of the work. In practice it often is just this, for subcontracting the hauling on construction jobs is a common practice. But whether or not this work is subcontracted, it is, in essence, a separate and a distinct operation and should be so treated in any consideration of the management problems which hauling involves.

The management of the hauling on a concrete paving job presents a typical illustration of the basic problem that is involved in managing hauling operations. Here the objective of the general contractor plainly is production at the mixer. This machine should be producing, let us say, 45 batches an hour—a batch every 1⅓ min., which is a batch every 80 sec. The crew is organized and equipped to handle the various operations that are involved at this rate. The cost of maintaining it, with the equipment that it is necessary to use, is, let us say, $60 an hour. This cost varies a good deal depending largely on the cost of labor. It is used here for purposes of illustration only.

This being the case, anything that causes the loss of a minute of time at the mixer costs the contractor $1. From his standpoint, then, any failure to receive material at the mixer at a uniform rate of a batch every 80 sec. constitutes a direct subtraction from profit for, the crew being in place and at work, the cost of having it there continues whether it works at capacity or below capacity.

On the other hand, the hauling equipment being capable of serving the mixer at the designated rate—45 batches an hour—, any failure of the mixer to take material at this rate causes the hauling equipment to operate at less than full capacity. To the subcontractor in charge of hauling this is quite as important as a slow delivery at the mixer is to the general contractor.

This rather simple illustration presents the major problem that all contractors face in managing the hauling on the job. To obtain satisfactory results the two organizations must be equipped to function at the same rate. Thereafter in their relation to each other they are like two intermeshing gears. If one lags, the other must lag, for they cannot move independently. The necessary absence of storage between the functions they perform precludes any other relationship. Inefficiency on the part of the general contractor destroys the efficiency of the hauling organization. Inefficiency in the hauling organization destroys the efficiency of the general contractor. This is quite unavoidable and, in the writer's opinion, it is of such importance that no efficient contractor can really afford to take the risk of placing the advantage which lies in efficiency here at the mercy of a subcontractor. Be that as it may, the fact that in many types of work production and hauling are interdependent but distinct operations presents a situation that cannot be avoided—a situation that is certain to cause a great deal of expense unless the operating details of both organizations are carefully worked out and pretty exactly executed.

To treat this matter in detail would involve a discussion of the whole field of job management, which obviously is impossible within the space of a single article. Suffice it to say, therefore, that in order to obtain a high degree of efficiency in the management of hauling equipment, the first essential is the determination of a specific rate of job output and the organization of the job as a whole (exclusive of the hauling organization) to handle that output. From the standpoint of the hauling organization the amount of this output is unimportant. The hauling organization can be organized to handle any output that may be required. But it cannot be organized at all, in any proper sense of the term "organized," until the load that it must carry is known.

Beside the total output to be carried, the rate at which this load will develop must be known. If the mixer is to produce 400 batches a day, that must be 40 batches each hour and 10 batches each 15 minutes if the hauling equipment is to work efficiently. It cannot be 50 batches whenever the general contractor gets his organization to clicking properly and 30 batches when things are not going so well. No hauling organization can be organized to serve a variable rate of production efficiently.

Four hauling operations

These two essentials having been given proper attention, the management of the hauling organization still faces a number of problems that do not lend themselves to as exact a solution in practice as the mere statement of them may seem to imply. The first of these is the fact that all hauling on construction work involves four specific phases:

1. The load must be taken on.
2. It must be moved to some definite point.
3. It must be discharged.
4. The hauling unit must be returned for another load.

This cycle is repeated hour after hour and day after day as the work progresses; and as the drivers become familiar with their duties, items 1 and 3 tend to assume the status of time constants. That is, it takes a pretty definite and a pretty uniform amount of time to load the hauling unit and a pretty definite amount of time to discharge it.

But, from the management standpoint, the matter cannot be left here, for while, even if left without definite managerial control, these two items tend to become constants, this by no means indicates that they are constants of the right size. The layout of the material yard at which batches are loaded may be such as to require trucks to spend two or three times the really necessary period in taking on a batch. The shovel operator may be habitually slow in loading the trucks. The conditions on the dump may preclude a prompt discharge of the load. There are any number of these things which tend, in practice, to make both the loading constant and the discharge constant longer than they should be. The development of a high degree of efficiency in the operation of the hauling organization requires constant attention to every condition which tends to extend loading time and discharge time beyond what it ought to be and an active effort to eliminate conditions which cause the loss of time either in taking on or in discharging the load.

Because the time losses that may be involved in improper loading conditions or improper conditions incident to discharging the load are small, many managers seem to feel that they do not deserve attention. On a job the writer once studied with some care, a slip scraper job, it had become the practice to stop the teams before the load was discharged in order to enable the dumpman to grasp the handles of the slip. A similar stop was made before the next load was taken on. Correcting this practice added about 20 per cent to the daily output. The fact in this case was that while each stop was a matter of only a few seconds, as the work involved a repetitive operation performed several hundred times every day, the cumulative effect of these small delays was large. This always is true of repetitive operations. A minute lost here and another lost there on an operation that is repeated over and over again cuts production a great deal more than is likely to be apparent until the amount of such losses is studied as a percentage.

Hauling formulas

Items 2 and 4 as noted above—hauling the load to destination and returning for the next load—are not as likely to be the cause of important losses as are loading and discharging the load. Teams travel at a surprisingly uniform speed. So do tractors, and if the road conditions are satisfactory heavy trucks also maintain a pretty uniform speed. Horses and mules travel at about the same speed both loaded and light, unless they are forced to a trot, which is not usually permitted. The same, in general, is true of tractors. Trucks travel faster light than loaded, and where light trucks or high-speed heavy trucks are used, the difference may be considerable.

In theory the round-trip time for any hauling unit is the sum of the loading time, the travel time required to reach the point where the load is discharged, the discharge time and the time required to return for another load. In practice another factor—waits and delays—must be added. If the loading time in minutes is denoted by the symbol a, the time in minutes used in reaching the point where the load is discharged by the symbol x, the discharge time by the symbol d, the time to return for another load by the symbol y, and the average time in minutes lost on account of waits and delays by the symbol w, the round-trip time t may be expressed algebraically as: $t = a + x + d + y + w$. Then n, the number of trips that can be secured per working day, is the number of minutes in the working day m, divided by the average round-trip time t—that is, $n = \frac{m}{t}$.

For teams, tractors and usually for heavy trucks x and y are so nearly equal that the formula given above becomes $t = a + 2x + y + w$.

These formulas are not very complex, and in practice they are quite easy to use, for while the speed at which different types of vehicles move is not the same, each type has a pretty definite and a readily determinable working speed which, of course, determines the correct value for x and y for any given haul distance. For trucks, road conditions affect this travel speed; but, in practice, road conditions do not much affect the speed of horses and mules or of tractors if conditions are such that any work at all can be done.

These formulas have been given in this discussion because of their usefulness in managing hauling operations. Their use enables the manager to determine what his hauling organization ought to do—to set up, as it were, a basis for the design of this organization. They also establish a definite standard of performance in each phase of the hauling cycle and therefore simplify any study of the causes that underlie an output that is below standard.

Hauling speeds

To illustrate the use of these formulas under practical conditions, loading a hauling unit should, for instance, take 1.5 min., hauling the load should take 2.4 min., discharging it 1 min., returning for the next load 2.1 min., waits and delays no time. Round-trip time should, then, be 7 min. These allowances are not guesses. They can be predetermined with great exactness. As the chances of profitable operation depend on making performance check with possibilities, the objective of management is then reduced to a careful search for the cause of any variation from the predetermined standard, to establish calculations of this sort and to eliminate the adverse influences, practices or conditions that are preventing performance from agreeing with the established standard. In the nature of the case this search can be conducted item by item, as it were, where the preliminary design of the hauling organization is based on a preliminary study of this sort.

The relation of the loading and discharge constants to the maintenance of a predetermined standard has already been discussed. When performance does not agree with a correctly predetermined standard, some of the trouble is pretty apt to be found here. Where animal power is used not much will be found in the time used in moving the load or returning for the next. The same is largely true where tractors are used. Where trucks are used more trouble is encountered. It is very difficult to secure truck drivers who can be depended on to drive at any predetermined rate of speed. They are forever driving too fast or too slow. Still the elimination of careless and indifferent drivers will correct most of the difficulty.

Incidentally, it may be remarked that a definite speed should be established for the operation of trucks. To do otherwise results either in underproduction or in the abuse of these vehicles.

Road conditions affect the travel speed of trucks. Some years ago the writer had occasion to observe hauling conditions on a road job on which heavy trucks were used. The subgrade was not stable enough to carry units of the weight selected. As a result three days of active hauling over it reduced the average hauling speed about 4 miles per hour, which in that case was about 20 per cent. Subsequent hauling operations reduced it still further. A condition of this sort cannot always be corrected. In general, however, conditions affecting travel time can be corrected once the exact nature of the trouble is known, but, as in the case of the loading and the discharge constants, a clear appreciation of the results that ought to be obtainable is a prerequisite to the attainment of these results. They are not likely to be secured merely as a matter of accident or fortuitous circumstance.

Waits and delays

The most difficult factor in the average round-trip time is the last factor—waits and delays. No organization functions perfectly over long periods of time. Neither labor nor equipment is so perfect as to make such a result possible. Obviously, it would be desirable entirely to eliminate all waits and delays. It is equally obvious that this cannot be done. The objective is a reasonable minimum.

But the problem is not quite as simple as this, for while some of the waits and delays originate in the operation of the hauling organization, others originate in the organization that it is designed to serve. If this general category is so defined as to make the term "delays" refer to time lost on account of conditions arising in connection with the operation of the hauling organization itself, and "waits" as time lost on account of conditions arising in connection with the operation of the organization that the hauling equipment serves, it will usually be found that a good deal can be done to eliminate both, once their nature and their extent is known with a reasonable degree of exactitude.

As a rule the service that a hauling organization renders will be satisfactory to the general contractor if delays as defined above are reduced to a minimum. Where it is not, the deficiency can be corrected by supplying a little extra hauling equipment. If, for instance, the operating efficiency of a hauling organization stands at 90 per cent, it will be raised to 99 per cent by the addition of 10 per cent of extra hauling equipment. Rendering a 100 per cent service to the general contractor is, then, possible, even though the efficiency of the hauling organization is considerably below par.

Unfortunately the same is not the case in the ordinary controlling relation as between the general contractor and the hauling organization. As a rule the general contractor is equipped and organized for a specific rate of production, and, as an equally general rule, he at times attains this rate even though it is not consistently attained. In short, the difference between efficiency and inefficiency is not the difference between a consistently high rate of output and a consistently low rate of output but rather the difference between a consistently high rate of production and a more or less widely and usually a rapidly fluctuating rate. A hauling organization can be readily adjusted to a low rate of production, but it cannot be adjusted to a highly and rapidly fluctuating rate. The greatest problem in the successful management of hauling as a subcontract is encountered at this point. Its only solution, so far as the writer's experience goes, is tactful assistance in the improvement of the management of the general contract.

Beside the problems mentioned above, the management of hauling is further complicated by the fact that, as a rule, the distance which materials must be moved varies from day to day. To meet this situation and still to furnish a 100 per cent service to the general contractor requires that the amount of hauling equipment used must be varied as the haul distance varies. Within limits this can be done, but on many types of work that involve a great deal of hauling, such as grading and paving, it is commonly true that some of the material must be hauled so far that it is uneconomical to provide 100 per cent hauling service during periods of maximum haul.

In one case that came to the writer's attention some years ago, a concrete paving job, the haul distances varied from ¼ mile to 19 miles. On grading work a maximum haul of 2,500 ft., as compared with an average haul of 500 to 600 ft. is not unusual. In cases of this sort it is perfectly obvious that if a 100 per cent hauling service is to be rendered at all times, the amount of hauling equipment to be provided is large and the amount of this equipment that ordinarily will stand idle is excessive. The usual solution is the acceptance by the general contractor of less than a 100 per cent service whenever the haul distance exceeds some predetermined length. What this length should be can be determined with a reasonable degree of accuracy, hauling distances and the organizations involved being known. Lack of space prevents an extended discussion of this matter here. Suffice it to say, then, that from the standpoint of the hauling contractor it is undesirable to provide equipment on which net earnings while working will not pay a profit over and above stand-by charges. From the standpoint of the general contractor any loss of production is expensive, for his organization is equipped and manned for full production. There always is some arrangement as to the equipment of the hauling organization whereby a fair division may be made of the losses that are certain to result from any variable haul distance, losses which become conspicuous when long haul is encountered. In making hauling arrangements this should be determined in advance.

Not infrequently some of the losses likely to be encountered here can be avoided if the hauling contractor provides some specified number of hauling units and then engages to rent other equipment locally when the haul distance is so great that he cannot provide 100 per cent service, if equipment can be had locally. Where this can be done it proves helpful, but as a rule it is difficult to do as the truck bodies used locally are not always suited to construction work and it is not always practicable to have local owners change them in order to secure work at occasional intervals of short duration.

In closing this discussion it may not be inappropriate to remark that here, as in other aspects on contracting as a business, the objective is profit, and the best means of reaching it is a careful study of cause and effect with the elimination of causes that are producing undesirable effects. The management of hauling involves its full share of complexities. A dozen trucks do not make a hauling organization. Turned loose to haul as the various drivers see fit, they will move a great deal of material. But acting under the control of a thoughtful manager who will consistently correct improper practices and systematize the details of their performance, they will move a good deal more. It is this difference which provides the profit that rightfully belongs to management—a difference which normally is quite large enough to pay for the time and detailed attention that good management involves.

Service Performance of Grid Deck on University Bridge, Seattle

AFTER nearly one and a half years of regular service in traffic, the grid bridge decking of the University bascule bridge across the Lake Washington ship canal, Seattle, can be reported from recent inspection by an editor of this journal to perform excellently. Traffic moves over it smoothly and without noticeable difference in action or effect from its passage over the adjoining concrete-slab floor of the bridge approaches. Nothing has been done to the grid decking after installation, and no repairs or adjustments have been necessary. Inspection shows it to be perfectly clean, as if just installed, although according to John A. Dunford, operating and maintenance engineer of bridges in the city engineering department of Seattle, the deck has never been swept or otherwise cleaned. No rusting or other deteriorating action is noticeable in the grid or the supporting steelwork. The installation of the open-mesh deck was reviewed in *ENR*, Oct. 12, 1933, p. 439.

During the more than a year that the deck has been in service, there has been no single skid accident, although in the year preceding the installation of the grid decking no less than 182 skid accidents occurred on the bridge, with six fatalities; the previous year's record is reported about the same. No claims of any kind have been presented to the city with respect to this decking, and no damage suits have been filed. Rumors that complaints had been made by users of the bridge that the decking tends to damage tires are stated by Mr. Dunford to be wholly without foundation.

The grid decking was adopted for this bascule to reduce the floor weight and thereby permit of widening the former four-lane roadway to a capacity of six lanes by adding cantilever extensions outside the trusses. All six lanes are floored with the grid decking, which weighs 22 lb. together with its transverse supports, against 45 to 50 lb. for the timber that it replaces; the grid decking itself weighs about 16 lb. per sq.ft., and the 6-in. channel supports over the stringers weigh 6 lb. per sq.ft. of floor. Thus a saving of about 25 lb. per sq.ft. was made through the installation of the grid decking, and this saving was sufficient to permit of adding the outer roadways.

The decking (Irving decking, designed and built by the Irving Iron Works, Long Island City, N. Y.) consists of sections 18 in. wide by 30 ft. long, spliced to give continuity. It comprises longitudinal bars $2\frac{1}{2}$x$\frac{3}{16}$ in., spaced $2\frac{1}{2}$ in. on centers, connected by sets of double-curved zigzag bars $1\frac{3}{4}$x$\frac{3}{16}$ in. flush on top with the longitudinal bars; the zigzag bars are of such shape as to meet the longitudinal bars about at right angles. Connections are made by $\frac{1}{8}$-in. rivets. The bridge is supported on 6-in. transverse channels spaced 15 in. on centers, which rest on the bridge stringers. To attach the grid decking to the channels, every fourth longitudinal bar of the grid has riveted to its lower edge a plate clip over each channel, and the bottom edge of the clip is welded to the top flange of the channel. This form of connection has proved satisfactory in service.

On an adjacent bascule over the same canal, the Montlake Bridge, which has a decking of creosoted block on planks, it is the practice to roughen the surface in winter by lagscrewing to the top of the block paving a series of transverse flat steel bars $1\frac{3}{4}$x$\frac{1}{4}$ in., spaced about 30 in. along the roadway, to prevent skidding of automobiles in wet weather. These cleats are left in place until about June 1, and are replaced about the middle of October. They are reported not entirely satisfactory as they cause vibration, the operator's house being jarred sufficiently to cause him to request removal of the cleats at the earliest possible date. This bridge, however, has no heel locks. The pavement of the Montlake Bridge consists of creosoted blocks 4 in. deep, with corrugated sides, set in asphalt and toe-nailed to the supporting planks. The decking weighs about 45 lb. per sq.ft.

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Cement Sample for Surface Area

Standard samples of cement (No. 114) have been added to the series of standard samples made available by the Bureau of Standards, Washington, D. C., for use in calibrating turbidimetric measurements of the surface area of cement. The cement samples have a surface area of 1,900 sq.cm. per gram, and leave 12.3 per cent of residue on a No. 325 sieve when tested by the wet method. The cost of the standard sample of 35 grams is $1. The turbidimeter method of determining surface area of cement was described in the A.S.T.M. *Proceedings*, part 2, p. 553 (1933).

The Bureau of Standards has also added a standard sample of nickel molybdenum steel (S.A.E. 4615), which has the following composition: carbon 0.203, manganese 0.661, phosphorus, 0.023, sulphur, 0.290, silicon, 0.290, copper, 0.122, nickel, 1.75, chromium, 0.75, molybdenum, 0.214, vanadium, 0.004. This standard sample is No. 111, and costs $2.50 per 150 grams.

Letters to the Editor

Broad Study of Droughts Urged By Australian Engineer

Sir—As a water engineer and hydrologist for more than 30 years I have always been keenly interested in the study of drought and its amelioration, and since the severe drought in England (1911) I have devoted most of my leisure time to the collection and investigation of drought data. I have been greatly interested, therefore, in the recent reports and articles in *Engineering News-Record* reviewing the drought conditions in the central area of the United States.

Throughout the collection of drought data, I have been struck by a marked imprecision with respect to: (1) the delineation of the area, (2) the varying severity of the drought within the area, and (3) the relative severity of any two droughts in the same or different areas. Some time ago it occurred to me that all these difficulties might be overcome by preparing monthly drought charts, on which were plotted the percentage deficiencies from the long-period (30 to 40 years, or more) monthly means and drawing "isodefs," or lines of equal percentage deficiency from the mean. The method is only strictly applicable to drainage areas of moderate extent over which the rainfall is of the same general character; but larger areas can be dealt with by combining the charts of the several drainage areas.

The method was fully discussed in my recent paper "The Cartographic Study of Drought," read before the Royal Meteorological Society in London, June 20, 1934, and to be published in the third issue of the *Quarterly Journal* of the society. The very severe Queensland drought of 1902 is reviewed in the paper. This drought lasted from January, 1902, until the end of the year, and affected an area of 627,600 square miles in the state of Queensland. The maximum and minimum drought areas in Queensland during this visitation were 592,100 square miles in October and 384,000 square miles in January. The average monthly severity is indicated by a mean deficiency of 72.1 per cent throughout the twelve-month period, with maximum and minimum values of 75.1 per cent in July and 62.0 per cent in December.

An inspection of monthly drought charts for any stricken area shows that the boundaries are constantly shifting and that the nuclei, or regions of maximum intensity, vary in position and extent from month to month. The axes of these areas move along the drought track, which may appear fortuitous or may follow a definite path, determined by various natural controls. This progression, however, cannot be determined until other visitations of similar severity in the same area have been investigated.

From cartographic studies of several droughts I am of the opinion that some of the more prolonged droughts of antiquity (Egypt, thirteen years, 682-694 A.D.; India, twelve years, 1344-1355 and 1396-1407, etc.) are really blurs, produced by perambulations of recurrent drought of shorter duration occurring over considerably smaller area than the total area of visitation. If, as Dr. Ellsworth Huntington suggests with a wealth of corroborative data, there is a climatic pulse of about 640 years (roughly 57 times the duration of the 11.2-year sunspot cycle) the fourth dry period since the beginning of the Christian era should culminate about 2010, in which case we are probably now entering upon a period of more frequently recurring drought not unlike those experienced in the first, eighth and fourteenth centuries.

If, therefore, drought should become more frequently recurrent or more prolonged during the next seven or eight decades, it will be essential to accumulate hydrologic data in recurrent drought areas. This will necessitate a closer study of the economies of storage and supply in all important drainage areas and of the secular variation of rainfall, as revealed by the more lengthy rainfall records.

Since 1900 there have been four severe droughts in England: 1911, 1921, 1928-29 and 1933-34; and five visitations in the United States: 1911, 1913-14, 1925, 1929-30 and 1933-34. The last in both groups have surpassed all others of recent times in amount of damage wrought and discomfort inflicted. The previous droughts of the century did not cause so much loss or discomfort, because they were preceded by several years with annual rainfall in excess of normal. However, this fortunate combination of circumstances, to mitigate the influence of severe drought, may not always eventuate.

For example, referring to the world's longest continuous record of rainfall—that at Padua, Italy—where the raingage was first installed in 1721 (a continuous monthly record is available from January, 1725, to the present), the maximum deficiency from the mean (44.2 per cent) occurred in 1822, just 50 years after the maximum excess of 81.5 per cent. Further, the two wettest years, 1772 and 1770, were only separated by a single year; the two driest years, 1822 and 1834, were only eleven years apart, and the driest and third driest year (1820) were separated by a single year.

It is to be hoped that the losses and discomforts of drought can be dispelled, or at least minimized, by a more general study of the problem and by concerted counteraction, reducing waste of natural resources and thus fulfilling our destiny, by further adapting the forces of nature to the service and use of mankind.

W. R. BALDWIN-WISEMAN,
University of Western Australia.

Crawley, Perth,
W. Australia,
July 2, 1934.

Reading Tunnel Contract Cancelled, Not Abandoned

Sir—In the *Engineering News-Record* of September 6, a news article is headed "Contractor Abandons Reading, Pa., Tunnel Job"; also the article states that Walter S. Rae abandoned his contract on August 28. The above is a gross mis-statement, and we are enclosing a copy of our letter of August 28 to the City of Reading and Mr. A. R. O'Reilly, chief engineer, *cancelling* our contract on the above work.

We ask that you kindly correct this information, as there is a vast difference in one's abandoning something and one's cancellation of the same thing.

WALTER S. RAE.

Pittsburgh, Pa.
Sept. 15, 1934

IN THE LETTER referred to, Mr. Rae states that his request for an estimate for work done to the end of July was refused and says further: "Seven days' notice is therefore given to you by me that the Engineers has failed to issue a certificate for payment within seven days after it was due on August 10, 1934, and that the contract will be terminated seven days after date of this letter (Aug. 28)......In addition to the above I am terminating the contract because the information furnished me as a bidder was incorrect and misleading and known to be so to the Engineer in that the assumed rock line on Sheet 3 of the contract drawings shows no drop in same below the line of tunnel, and the boring data as shown on Sheet 3 are absolutely unreliable and misleading; the core boxes to which bidders were referred for information were incorrectly marked." —EDITOR

Yellow River Regulation By Use of Settlement Basins

Sir—With reference to the interesting articles by E. W. Lane and A. M. Shaw in your issue of June 28, p. 836, which allude to the possibilities of settlement basins for the Yellow River, I should like to point out that this method of treatment was strongly advocated by W. F. Tyler in 1906 ("Notes on the Hwang-ho," China Imp. Mar. Customs, II. Special Series, No. 29) and has been recommended for the Yung-ting ho River (an analogous case in North China) by the present engineer to the Haiho Conservancy Commission, Mr. Hardel.

This method presents extraordinary administrative difficulties in China, since adequate settlement areas are mostly under intense occupation.

HERBERT CHATLEY,
Engineer-in-Chief,
Whangpoo Conservancy Board.

Shanghai, China,
Aug. 1, 1934.

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September 20, 1934

New Possibilities

AT THE TIME the city of Seattle placed grid decking on the University Bridge, nearly two years ago, service experience was lacking to verify the hope placed in this new type of floor that effective roadway service could be obtained at reduced dead weight. Since that time the performance of the floor in everyday use has shown it to meet all the demands ordinarily made on bridge floors, as reported more specifically on another page. The grid floor, therefore, becomes an active competitor of other floor types. It has special claim to consideration in those kinds of service that place a premium on light weight, as in movable bridges. But its non-skid performance in the Seattle service also entitles it to note, especially under conditions that favor skid accidents. The Seattle climate did not subject it to the test of snow and ice, but the hazard of wetness that makes many a bridge a passage of terror in bad weather was successfully overcome. Thus we have available a new means of eliminating the slippery bridge floor, a gain of moment.

Stream Pollution Responsibility

THE CONSEQUENCES of uncurbed stream pollution are revealed in a new light by the proposal, described on another page of this issue, that a storage dam be built on the Savage River to increase the dry weather flow of the upper Potomac. Community and industrial wastes poured into the Potomac at or above Cumberland, Md., in ever-increasing volume far exceed the ability of the stream to assimilate during low-flow seasons. The result is a noisome mess. The industries themselves find their operations greatly handicapped, the communities that have developed around the plants are compelled to live in a fouled nest, and the river is unfit for public water supply for many miles downstream. Unfortunately, the situation is by no means unique, for many other regions of the country present closely similar conditions. Since the sustained utility of our water resources is indispensable to the national wellbeing, sound public policy demands that the prevention of serious impairment by industry wastes be considered an essential part of the industrial process and its costs be determined accordingly.

San Francisco Transit

PROBLEMS IN HANDLING the traffic that the new Bay Bridge will convey into San Francisco are brought into the limelight by the announcement of the Bridge Authority that interurban electric trains from the bridge will be routed around a downtown elevated loop. Such a terminal will make major changes in the city's travel habits. Heretofore all East Bay traffic—pedestrians, street-car patrons and automobiles—has passed through ferry terminals at or near the foot of Market St. Two years hence all this will change, and traffic will reach the city farther south and some distance inshore. Pedestrians who can pass from the ferry terminal to the north side of Market St. without crossing that main artery, will have to cross that thoroughfare when they arrive by the bridge lines. That is typical of numerous changes that will affect city movements. A plan developed by B. M. Rastall to meet the new transit requirements, as reported in our news pages, attempts to take account of all phases of the problem. Whether this plan or some other be found best, means must be devised to improve local transit if the city is to be prepared for the new conditions introduced by the bridge. San Francisco now has an opportunity to develop rapid transit facilities that will be essential within the city itself and will be useful in establishing closer relations with the East Bay and peninsula districts. This is not a problem for the bridge builders; it must be met by the city and by the railways to which the city grants franchises.

A Call to Duty

STRESSING the sole responsibility of the engineer for safe roads and vehicles, the article by Professor Tucker in this issue makes an appealing plea for engineers to assume leadership also in bringing about safe use of the highway. As a deep student of road accident frequencies and causes, Professor Tucker has become convinced that the road, the vehicle and the operator are so closely associated as causes of accident that the control of all three should be under a common direction. The logic of this position is unquestionable; the fact that it has not penetrated public consciousness is due largely to the inaction of engineers. Where they have not been wholly indifferent to the operation of their works they have been strangely inept in pressing their claims for the right of control. Recently there have been indications that a more purposeful attitude is being assumed, and if the article in this issue helps to strengthen the new spirit it will have proved its worth. Road engineers cannot afford to rest idle under the charge, which it shows justified by accident frequencies, that the road is the most dangerous of all modern works of the engineer.

The Municipal Engineer

NOT FOR YEARS has the situation of the municipal and public-works engineer been so complex and so intimately concerned with the general welfare as today. More concrete tasks of the depression have fallen on his shoulders than on those of any other group. His is the responsibility for finding work-relief jobs, for designing overnight the works and structure that are to provide those jobs, for creating in the turn of the hand a foolproof system of work assignment and a graftproof system of inspection and payment. This responsibility he must discharge though his staff has been cut to the bone and he himself is compelled to burn the candle at both ends while idle engineers walk the streets. Over and above this he must use his powers of conviction to induce confused and apathetic legislators to support his efforts. The existence and business life of the community hinge on his success far more intimately than even the most alert businessmen acknowledge. In such a time of pressure it is imperative that public-works engineers take counsel together and fit their organization to most effective action. Hence the critical importance of what is done next week at the Rochester meeting of the American Society of Municipal Engineers and its associate groups. Cooperation and better organization are among their problems, and these first of all demand careful thought with a view to highest degree of vitalization. With vision and force, and the full support of its municipal constituency, the society's work at its meeting may achieve a significant advance.

Realities and Visions

WHAT has the Tennessee Valley Authority actually done? How far has it gone forward with the ambitious program it laid down when first formed, a year ago last June? These and like questions are asked frequently. In attempting to answer them S. T. Henry, an experienced observer who has had an unusual opportunity for close study of the TVA operations, sets forth in this issue his views of what the TVA has or has not accomplished in its widely varied undertakings.

With respect to the concrete undertakings that were assigned to the TVA either in the basic act or by later decision, namely, construction of Norris and Joe Wheeler dams and the production of fertilizer at the nitrate plant at Muscle Shoals, the TVA has made notable progress. It also has made definite progress along the line of its proposal to increase the demand for power by supplying cheap power for domestic purposes, having begun to sell power in a few small communities at rates well below former rates. These are two weighty accomplishments. On the other hand the still more weighty problem, that of broad regional development to remake the valley on a definite plan for the fullest use of its economic possibilities, has seen little advance.

Such was to be expected. Given a definite assignment, men of ability will see that it is ably and promptly executed; but given an intangible assignment requiring for its accomplishment the application of a number of elusive principles, even the best of men can make but slow progress. Further, the region is populated with intelligent people possessing a high sense of their own independence, not with guinea pigs to be experimented upon, regimented, or made to change their habits at will. They cannot easily be shifted from farm to factory or from factory to farm, nor can those on the farms be compelled to cease growing corn and take up the growing of carrots simply to satisfy another's whim.

These considerations then, may serve as an aid to forecasting the probable future progress of the Tennessee Valley Authority work. So long as the federal government is willing to put up the money we may expect to see the construction of notable dams, power plants and transmission lines and the production of power and fertilizer. We may also expect to see the construction of large manufacturing plants that can use great blocks of cheap power; for, although such plants may not fit into plans for decentralization of industry as put forward by some of those directly interested in the Tennessee Valley project, an increasing need for a ready market for power will force the scrapping of a few such ideals.

There also will be constructed experimental plants for the exploitation of some of the region's undeveloped natural resources. Such shifting of the population as these changes will require may be expected; the same is true of such changes as cheap power will bring to home and farm. But these changes will be slow. Five or ten years hence many of the more visionary projects of today for completely planned communities will still be found to be visions. The clear indications are that the Tennessee Valley will develop along much the same lines as any other region, save that its progress is likely to be more logical and more rapid due to the study now being concentrated upon its orderly economic development. And this, in fact, is what in last analysis is to be hoped for as the outcome of this far-ranging experiment in human service.

The Third Party

AFTER six months of code life, an epoch in these speedy times, the construction field looks back on large accomplishment. Its comprehensive code system is substantially complete. The major elements of an administrative mechanism have been built up. The principle of fair competition is established.

If every phase of construction integration were in similarly favorable state the picture would be a bright one. But it is less certain that much progress has been made in bringing the numerous men and interests of construction into support of the code principle. Many, though they recognize its abstract value, are finding the new course strange and full of difficulties. They have not learned how to fit their old habits to the new ways.

In the long run, construction self-regulation can succeed only through universal adherence to its basic principle. That is obvious. The issue is whether construction shall stand on a sound business footing and better its efficiency and stability through the new means of cooperation in ethical self-government. Before another six months this issue will be decided; just now it is in the balance.

Many formidable difficulties still stand in the way of full accomplishment. In the highways and byways of construction there is a good deal of skepticism about the system; one may hear that it is ponderous, that it does not fit the local conditions, that it is just another burden and restriction. There are other obstacles, of course; the maze of wage adjustments yet to be met, the puzzles of new rules, and untenable labor conditions written inflexibly into code clauses, are among them. But these latter can be overcome by persistent effort.

Until all who are engaged in construction become united in their support, the success of the undertaking will be barren. The third party to the adventure is the deciding factor of today. The NRA and the code-administering authorities may do their best, but until the member of the industry, be he contractor or engineer, housebuilder or painter, gives equal support and service the chance of progress is small.

Up to now the construction code movement cannot claim to have enlisted the full aid of this third party. Have its leaders been sufficiently energetic in their selling effort? In many respects, it would appear, they have proceeded like the old-time merchant who set up shop and waited for friends and patrons to come as customers. The customers have been rather too few. Effective promotion doubtless can change this condition.

Construction men are by no means hostile to the movement; on the contrary active support can be had throughout the country once every member of the industry is convinced of its necessity and effectiveness. A powerful selling movement centered on enthusiastic leadership in every city and town, even in the country districts, would with certainty accomplish this. For, only through a general conviction that fair practice is for the good of all may the art of construction expect to make progress by self-regulation and integration.

CURRENT NEWS

PWA Reorganizing for Better Supervision of Field Operations

TO KEEP PACE with the Public Works Program in its construction state, PWA is being reorganized and the personnel at headquarters generally reduced as field operations increase. The federal and non-federal projects divisions have been consolidated under Fred Schnepfe, former chief of the Federal Projects Division. Originally drafted from the Army and Navy, Major R. W. Crawford and his staff of engineers in the non-federal projects division go back to regular details. Engineers in the examining division are being assigned to the field under the Inspection Division or to the offices of PWA state engineers, to assist them on specifications work which is now piling up rapidly. With 50 to 60 projects going into construction every week, the inspection and auditing divisions are being expanded by the transfer of personnel from other divisions no longer active. Major Philip B. Fleming, acting deputy administrator since the departure of Colonel Waite, probably will be appointed to succeed him.

The week's allotments include $3,610,000 to complete the new Archives Building, Washington, D. C., by construction of additional stack space: $352,000 to Army Ordnance Division for three projects at Rock Island Arsenal; $290,000 to Army Quartermaster Corps for construction of barracks at Carlisle Barracks, Pa.; $12,000 to the Bureau of Reclamation for investigating irrigation possibilities of Upper Colorado River Basin states; $1,219,000 to Houston, Tex., for a City Hall; and $2,952,900 for sixteen other non-federal projects.

Saluda River Power Project Considered by Power Commission

Construction of a publicly owned hydro-electric power plant on the Saluda River in South Carolina is proposed in an application for a license made to the Federal Power Commission by Greenwood County, South Carolina. The commission has set Oct. 11 as the date for a hearing upon the application.

The Duke Power Co. has filed a formal protest against granting the application.

The project provides for construction of an earth dam across the Saluda River at Buzzard's Roost, creating a reservoir having an area of 12,000 acres and backing water upstream to Ware Shoals. The dam would raise the water to an elevation of 440 ft., giving a gross storage capacity of 275,000 acre-ft. In a separate channel would be located the power plant and spillway. Three units capable of delivering a total of 20,000 hp. will be installed in the power house. A main 44,000-volt loop transmission line will be built to the county seats of Greenwood, Laurens and Newberry counties.

Bids for Tygart River Dam Will Be Opened on Oct. 16

Bids for the construction of the Tygart River Dam near Grafton, W. Va., will be opened by the U. S. Engineer Office, Pittsburgh, on Oct. 16. The dam, first of a series planned in a comprehensive flood control scheme on headwaters of the Ohio River, will be a concrete gravity section structure 232 ft. high and 1,850 ft. long. Principal quantities include 358,500 cu.yd. earth and rock excavation, 1,113,735 cu.yd. concrete, 237,700 lin.ft. core and grout hole drilling, 1,890,000 lb. reinforcing bars and about 4,000,000 lb. gates and pipes. The government will furnish, f.o.b. Park View, W. Va., all cement, valves, valve hoists, culvert linings, trash rack frames and bars, and all piping and fittings. The contractor will furnish all other materials. Specifications call for the structure to be built within two cofferdams. Completion date is specified as 1,080 calendar days after signing of contract, with heavy penalties in effect thereafter. The project is financed by PWA allotments, with $8,000,000 available at present. A description of the project appeared in *ENR* July 12, 1934, p. 48.

Federal Corporation Acquires Cleveland Housing Land

The biggest eviction order in Cleveland's history went into effect on Sept. 11, when every resident between E. 22nd and E. 30th Sts. and Cedar and Central Aves., was ordered to vacate his premises by Oct. 15. The order followed acquistion a week previous of 75 parcels of land by the Public Works Emergency Housing Corp., for use in its large slum clearance and low cost housing program. Title passed to the federal government on Sept. 10, when it filed a $565,000 check in payment.

A. W. Du Bois, federal housing project manager in Cleveland stated that bids for demolition work would soon be advertised. Plans for the new housing are practically completed according to Walter R. McCormack, architect.

Two-Shift Operations Used On 462 PWA Projects

Two-shift operations are being used by contractors on 462 non-federal PWA projects. PWA officials have encouraged this action because it provides more employment on the jobs and indirectly speeds the production of materials and supplies. A recent survey indicated that double shifts are being used on about one-third of the non-federal projects.

Under the usual two-shift arrangement a crew begins work at 7 a.m. and works until noon, when its place is taken by a second crew working from noon until 5 p.m. By this arrangement each crew works 30 hours a week, on the basis of six days, the maximum allowed by the PWA contracts.

Survey to Appraise Federal Policy of Land Reclamation

A SURVEY and appraisal of reclamation results has been directed by Secretary Ickes of the Interior Department on the proposal of Dr. Elwood Mead, Commissioner of Reclamation. It is designed to determine whether the policy of federal land reclamation and its administration are justified by the results. The study is to be carried on by John W. Haw, director of agricultural development of the Northern Pacific Ry., St. Paul, and F. E. Schmitt, editor of *Engineering News-Record,* New York. This committee is expected to leave shortly on a tour of observation, accompanied by George O. Sanford, chief engineer of the Bureau of Reclamation at Washington.

Projects to be visited

Projects to be visited include: Huntley, Mont., Kittitas division of Yakima, Wash., Orland, Calif., Yuma, Ariz., and Strawberry Valley, Utah. These projects, typical of soil, climate, water supply and crops, were selected to give a cross section of the agricultural and economic status of federal reclamation development as a whole.

In outlining the reasons prompting the inquiry and the program of the committee Secretary Ickes said, "The widely conflicting views now held of the value of federal reclamation as a national policy show the need for a better understanding of its operations and results. The public and the people living on these projects should have more information as to conditions and problems of reclamation. In measuring its achievements consideration should be given to its contribution to the national welfare and to the opportunity it creates for those settlers who are obligated to pay the cost. To secure this information it is proposed to have a committee make a critical analysis of typical projects and report facts and conclusions."

Policy to be reviewed

It is the view of Secretary Ickes that the time has come for an appraisal of the relation of the reclamation program to the well-being of the country as a whole, and particularly the future development of the west. The survey will be an impartial appraisal of the agricultural possibilities on the projects and the extent to which they are being utilized and an estimate of the achievements and defects of the reclamation policy with a view to recommendations for possible amendments in the existing reclamation law.

The committee will also make a study of the relations of irrigation and power as a part of the reclamation policy. It will investigate the development of power as an adjunct to irrigation enterprises and collect data upon which a future definite policy may be inaugurated regarding the ownership, operation, and placing of profits of the power plants.

Code Authority Urges Modification of "15 Per Cent" Order

IMPORTANT developments at the meeting of the executive committee of the Construction Code Authority held in Washington Sept. 13 included increased efforts to bring about modification of the President's 15 per cent order referring to public construction, issuance of two additional explanations of the code covering bidding practices, appointment of important committees and the decision to hold meetings of the authority outside of Washington as part of an active educational campaign to promote effective administration of the code.

By direction of the authority at its recent meeting in Chicago, a resolution was sent to the Administrator urging him to recommend to the President the exclusion of materials and services entering into construction from the provisions of the much discussed 15 per cent order. This Executive Order No. 6767, modifying Executive Order No. 6646, permits material vendors to sell to any governmental agencies construction materials at prices as much as 15 per cent below the prices filed under their respective codes if operated on an open price system. This means that such materials may be sold to governmental agencies at 15 per cent less than the price at which members of the construction industry may buy the same materials.

Replies received from the Administrator and other NRA officials to whom copies of the resolution were furnished indicate that the subject is under careful study by NRA, and that the view of the construction industry will be considered in arriving at a decision, but calling for specific information to indicate to what extent recovery within the construction industry seems to be retarded by this order, as claimed in the authority's resolution. The executive committee has accordingly ordered a thorough investigation to be made to list instances where day labor operations are superseding contract performance, or where contractors are being asked to bid only for supplying labor and supervision in order that governmental jurisdictions may avail themselves of any discounts offered by material vendors.

The Divisional Code Authority for General Contractors has been particularly active in opposing this order, and in studying its detrimental effects throughout the country.

FHA action

At a meeting of the executive committee of the Construction Code Authority it was reported that the Federal Housing Administration has made a definite decision with regard to the matter of compliance with the construction code on projects carried on under the Home Modernizing Program, Title I of the Federal Housing Act. Since the housing administration will not make direct loans to home owners, it will not require members of the construction industry performing modernizing work for home owners to file a certificate of compliance as a precedent to adding the loan to the 20 per cent insurance plan, nor does it feel that it can compel lending institutions to require such certification of compliance, since the loans are character loans and are not secured by the property on which the physical improvements are made. However, work performed by members of the construction industry is governed by the construction code, and home owners may require such certification of compliance at their option, although such certification is not necessary to insure compliance with the code.

Educational program

As a means of arousing interest in the construction code the executive committee decided to continue the practice of holding meetings outside of Washington. In addition to the executive sessions, open sessions will be held for members of the construction industry where problems may be freely brought forth for discussion. The educational program, supplementing the efforts of the various divisional code authorities and trade associations, will intensify present efforts to disseminate information about the code to promote its effective operation and observance.

European Housing Experts Study Chicago Conditions

During a 4-day conference in Chicago, Sept. 6 to 9, the three experts on housing problems in Europe, Miss A. J. Samuels and Sir Raymond Unwin of England and Ernest Kahn of Germany who are touring the country in the interest of better housing had a chance to familiarize themselves with conditions in the nation's second largest city. (*ENR*, Aug. 30, p. 285). A review of available maps was explained by the staff of the Metropolitan Housing Council. There followed a series of inspection trips through about 100 miles of Chicago streets, to view the slums, the segregated racial districts, the densely populated districts which local housing experts fear will soon disintegrate on account of lack of recreation and other open space requirements, districts with houses on the rear of lots, blighted areas of the south side's former best section invaded by a growing negro population, the back-of-the-stockyards area where there are numerous long wooden two and three-story buildings of the single room type left over from the days of caring for newly arrived immigrants, the steel mill satellite areas now being evacuated to a degree by Mexican labor which is returning home since the Mexican government is paying carfare, and finally the empty lot subdivisions on the outskirts of the city. Inspections were also made of the 453 apartment buildings for negroes erected on the south side by the Julius Rosenwald Estate and the 628 suites for white-collar people erected on the near north side by the Marshall Field Estate.

No definite answers to Chicago's housing problems as such came out of the conferences but a large amount of educational work was accomplished.

The group which is touring the country under the auspices of the National Association of Housing Officials are also to visit Milwaukee, St. Louis, New Orleans, Birmingham, Atlanta and Knoxville. In October a week's conference with leaders in the field will be held at an unnamed city in the East.

Building Material Manufacturers Learn About Housing Drive

BUILDING material manufacturers had the opportunity of learning first hand of the extensive publicity program of the Federal Housing Administration at meetings held in Washington last week. They also had an opportunity to score the reluctance of some banks to join in the modernization campaign. This criticism was also voiced by President Roosevelt in Hyde Park, who stated that bank examiners are not "using the rule of reason" in passing upon bank loans, particularly small ones. The Chief Executive further revealed that he is working with Secretary Morgenthau and fiscal officers to correct that situation.

Previous to the voicing of the complaint against the banks for non-cooperation with FHA, cooperating banks, which now total 6,000 throughout the country, were generously praised by officials of the housing organization. Roger Stephan, director of modernization credit of FHA, in defending the non-cooperating banks, stated that "You manufacturers will have to provide the stimulus that will bring them in. This is not a lending plan, but a selling plan—selling re-modernization."

Mr. Stephan added that despite the "archaic" law in some states restricting banks to six per cent interest loans, some are going ahead with the FHA program although it is a technical violation of their state laws.

One industrialist pointed out that it is too much of a load for manufacturers to sell the public and then the banks and advocated that public lending agencies be set up where local banks won't cooperate. Mr. Stephan definitely stated that that would not be done. He pointed out that finance companies operated by manufacturing companies and others could take FHA loan papers and get it insured under the law and suggested that manufacturers having such financing subsidiaries take such action.

Other officials of the FHA appealed to the manufacturers to support the program in their advertising and through other facilities. At an earlier meeting on Sept. 10 officials of the FHA had called upon advertising agency executives for cooperation in putting over its better housing campaign. In substantiation of their optimistic claims of acceptance of the better housing program throughout the country, FHA representatives pointed out that whereas they had intended putting on campaigns in only 480 key cities this fall and winter, the response has been so great that these community campaigns are now under way in 1000 cities and towns.

FHA loans for new house construction are expected to be opened up sometime in November, it was revealed. It was estimated that it would take 3 to 5 months to get the housing program under way, with a construction boom forecast for the Spring of 1935.

James A. Moffett, FHA administrator, told the advertising men at luncheon that industrial leaders have promised cooperation and are agreed that the housing plan offers the biggest potential market for labor and materials and general business stimulation the country has ever had.

Rapid Transit Program for San Francisco Under Study

With plans for interurban traffic on the San Francisco-Oakland Bay Bridge made public (*ENR*, Sept. 13, 1934, p. 350), attention is focused on San Francisco's need for some form of rapid transit system, particularly relieving the congestion of street cars on lower Market St. City officials have not yet announced any program but supervisors of San Mateo County (adjoining) voted to retain Bion J. Arnold as consultant on their interests in the subject and the San Francisco Chamber of Commerce has before it a comprehensive report just prepared by B. M. Rastall, who recommends a rapid transit system designed to fit in with the loop terminal plan announced by the Bridge Authority.

Mr. Rastall points out that surface travel on Market St. would be too slow and the time has not come when the expense of a subway would be justified. His rapid transit plan, covering a 5-mile route, proposes 1.8 miles of elevated track extending from the bridge loop out Minna St. parallel to Market, coming down to surface tracks on outer Market, where surface travel could be faster, and thence into the Twin Peaks tunnel, which is well adapted for rapid transit. This plan would bring points in the west side of the city within 15 min. of the downtown district as compared to the 40-min. trip via surface lines now required.

He estimates the cost of such a system, including property damage, at less than $4,000,000 and believes that even on minimum travel estimates such a system would pay a profit from the start, even on a 5-cent fare. This plan provides for connection via surface lines into all parts of the city including later rapid transit to peninsula cities. The Golden Gate Bridge is making no plans for including railway tracks and is not now a factor in the rapid transit problem.

Pine View Dam Contract Awarded On Low Bid of $677,898

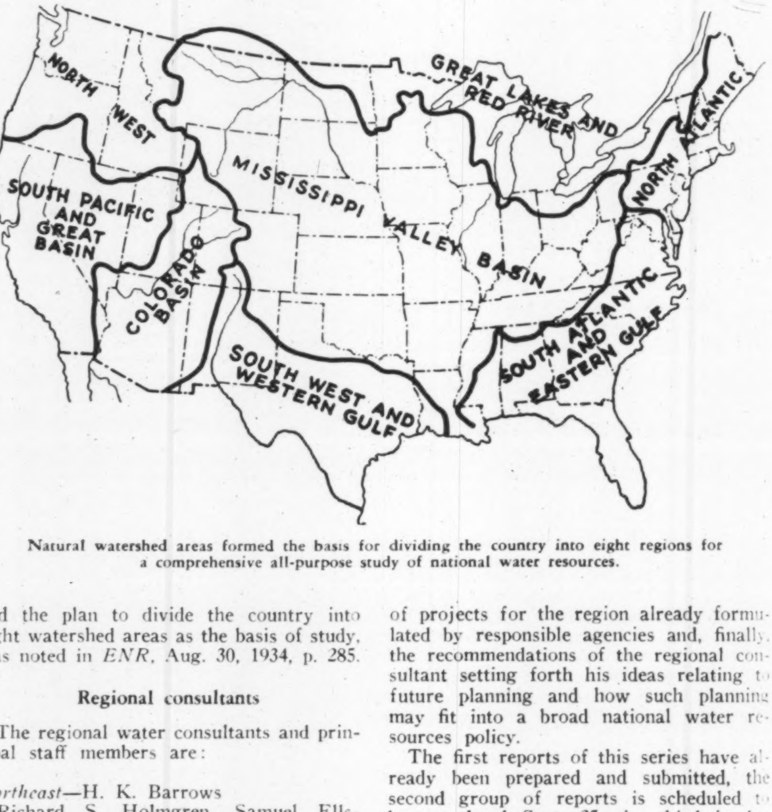
Contract for the construction of the Pine View Dam and appurtenant works on the Ogden River in Utah has been awarded to the Utah Construction Co. and Morrison-Knudsen Co., both of Ogden, Utah, on a low bid (submitted jointly) of $677,898. The allotment made by the PWA for the Ogden River work is $3,000,000, and bids will be advertised for the remaining development early this fall. The purpose of the Ogden River program is to provide a supplemental water supply for about 19,000 acres of irrigated lands in the vicinity of Ogden, Utah.

The Pine View dam will be an earth and gravel fill structure about 75 ft. high and 500 ft. long at the crest, containing 250,000 cu.yd. of material. The dam will provide a reservoir with a capacity of about 38,000 acre-ft.

In addition to the construction of the dam, the contract provides for reconstruction of the Ogden municipal water supply system from a point near the dam to the source of supply in Artesian Park, the removal of the rapid transit tracks in the canyon at the damsite, and the reconstruction of a section of highway.

National Water Resources Organization Functioning in Eight Drainage Areas

THE organization of the water resources section of the National Resources Board has been completed and the eight regional water consultants are engaged in organizing data which will form the basis for the final coordinated report to be submitted Secretary Ickes, chairman of the board, to President Roosevelt in December. This program of study and the temporary organization constitute an emergency investigation established for the specific purpose of rapidly assembling data to provide an inventory of the water resources of the nation and preparing a plan and policy for their more orderly development in the future. The organization was assembled between July 25 and Aug. 10 under the direction of Thorndike Saville, executive engineer. The organization of this water resources investigation was reported in *ENR*, Aug. 16, 1934, p. 221, and the plan to divide the country into eight watershed areas as the basis of study, was noted in *ENR*, Aug. 30, 1934, p. 285.


NORTH WEST
GREAT LAKES AND RED RIVER
NORTH ATLANTIC
MISSISSIPPI VALLEY BASIN
SOUTH PACIFIC AND GREAT BASIN
COLORADO BASIN
SOUTH WEST AND WESTERN GULF
SOUTH ATLANTIC AND EASTERN GULF

Natural watershed areas formed the basis for dividing the country into eight regions for a comprehensive all-purpose study of national water resources.

Regional consultants

The regional water consultants and principal staff members are:

Northeast—H. K. Barrows
Richard S. Holmgren, Samuel Ellsworth and H. B. Kinnison, engineers; Irving B. Crosby, geologist.

Southeast—Brent S. Drane
Benjamin M. Hall, Jr., A. P. Michaels, and Robert L. Sumwalt, engineers; W. A. Nelson and H. J. Bryson, geologists.

Great Lakes—L. K. Sherman
Paul E. Green, Robert E. Horton and Louis C. Sabin, Adolph Kanneberg, and Louis E. Ayres,

Mississippi Basin—Charles H. Paul.
N. W. Bowden and Howard E. Simpson.

Southwest—O. N. Floyd
James L. Lochridge and N. C. Hamner.

Colorado River—H. T. Cory and staff of the Bureau of Reclamation.

California and Nevada—W. L. Huber
August Kempkey and Alex M. Torpen

Northwest—Joseph Jacobs
George N. Carter, Stirling B. Hill, Ray E. Koon and Glenn L. Parker.

The accompanying map indicates these watershed regions.

Plan for report

The reports to be prepared by each of these eight regional consultants are: (1) an inventory of the water resources of the region; (2) an inventory of the present utilization of these water resources; (3) an analysis of the legal and administrative problems relating to the water resources of the region; and (4) a description of the existing planned water resources development in the area, proposed planning of projects for the region already formulated by responsible agencies and, finally, the recommendations of the regional consultant setting forth his ideas relating to future planning and how such planning may fit into a broad national water resources policy.

The first reports of this series have already been prepared and submitted, the second group of reports is scheduled to be completed Sept. 25, the third is due Oct. 5, and the final set of the series must be completed by Oct. 10. This program will permit these regional reports to be abstracted, reviewed, and analyzed to form the background from which the advisory committee and others in the Washington headquarters will prepare the final report and recommendations to be submitted through the National Resources Board to President Roosevelt in December.

To effect better coordination and more uniform efforts among the engineers in charge of the eight regional areas, they met in Washington, D. C., last week for a brief conference.

Plans Outlined for Operation of Bid Depositories

PROPOSED minimum requirements and regulations for the operation of bid depositories for the general contractors' division of the construction industry, recently developed by the Divisional Code Authority for General Contractors, Inc., have been sent to the chairmen and managers of all of the state administrative agencies for comment and suggestions prior to their submission for the approval of the Construction Code Authority.

The proposed rules and regulations would mandatorily apply to all general contractors' bids submitted on private construction projects amounting to $1,000 or more, but would not apply to public work on which bids and alternates are opened and read publicly and on which information is available to the public generally. This application, therefore, in practice would eliminate practically all highway work, while heavy engineering and railroad construction (subject to Chapter II-B of the code) is specifically excluded in the application of the proposed rules.

Following is a summary of the several articles of the proposed regulations:

1. *Definitions*—Mostly self-explanatory. The term agency means the state administrative agency of the Divisional Code Authority for General Contractors. Depository means the state agency designated as the bid depository for a particular state. Designated area means any area defined by the state agency as a region, which may include the whole state or any subdivisions thereof.

2. *Application*—These regulations apply to all bids submitted on private construction projects amounting to $1,000 or more. They do not apply to work to which the provisions of Chapter II-B of the code are applicable.

3. *Bid Depository, Organization*—The executive manager or secretary of the agency or sub-agency shall be designated as the individual to receive duplicate bids for the depository.

4. *Notice to General Contractors*—Every contractor of record shall be notified by the divisional code authority that bid depositories have been established, giving the address of every depository providing contractors bidding on out-of-state work knowledge of the proper depository to use. After notice has been mailed, it is mandatory upon the general contractor to file duplicate bids, except on public work and that exempted above.

5. *Filing of Duplicate Bids*—General contractors shall file duplicate bids, properly marked and enclosing 6c. postage for mailing of bid tabulations, on all work to which these regulations apply. Duplicate bids filed by mail must be postmarked before the hour designated for opening of bids; those delivered in person must be delivered before the hour of opening.

6. *Statement of Deposit*—Statement must be made on the original bids that duplicate bids have been filed.

7. *Time for Receipt of Bids*—The time set by awarding authorities for receipt of bids should be a specified hour, date and place. The state agency, when notified by a contractor that no specific time has been set for receipt of bids, should emphasize to the awarding authorities the code provisions governing receipt of bids.

8. *Opening of Duplicate Bids*—The designated individual shall open the duplicate bids within 24 hours after the time set for opening of original bids, in the presence of a disinterested party and a notary. Tabulations of all bids shall be sent to all bidders, but in no case shall the information be given to anyone other than a bidder. If a contract is awarded to anyone except the low bidder, the contractor must supply, if demanded, proof to the agency that the prices of his original bid are those upon which the contract is based.

9. *Compliance* — Non-conformance with these regulations is a violation of the code.

10. *Effective Date*—These regulations become effective within 30 days after approval by the Construction Code Authority.

Since it is necessary that all members of the construction industry file duplicate bids, suggestions have been made that bid depositories be operated so that sub-contractors' and general contractors' bids might be filed at the same place. While some of the state administrative agencies are sponsors of such depositories, it is not possible for the Divisional Code Authority for General Contractors to devise rules and regulations for the operation of bid depositories which will be mandatory upon sub-contractors, E. J. Harding, secretary of the authority, states. State agencies may, however, cooperate with the members of the several divisions of the construction industry code within their respective states toward the establishment of a bid depository where duplicates of both general and sub-bids may be filed.

Flood Threatens Cairo, Egypt As Drainage Pumps Fail

Serious inundation threatened sections of Cairo, Egypt, on Sept. 16 when the pumping stations of the city's drainage system failed as the result of a heavy load caused by abnormally high flood waters in the Nile River. One of the main pumping stations, according to report, failed Sept. 13, causing a minor overflow of sewage in a small section.

Use of small temporary pumps relieved the situation for several days, but the additional load resulted in the partial failure in other pumping stations and the backing up of sewage became more general. This situation developed both in the native districts and in the residential areas occupied by English and American residents.

Dallas Selected as Site for Texas Centennial in 1936

Dallas has been chosen as the site for the Texas centennial celebration to be held in 1936. The city made the highest of several offers submitted to the commission in charge of the centennial, including a cash offer of $3,565,000 and the state fair site and improvements which made an aggregate value of $7,971,000. The bid is contingent upon the provision of not less than $15,000,000 through legislative appropriation, or from other sources, to insure the success of the project. An effort will be made to insure federal appropriation for the centennial.

Suit Indicates Damage to Result If Fuse-plug Levee Breaks

About 35 miles of Mississippi levee construction protecting 135,000 acres of farm and timber land in the Bird's Point-New Madrid, Mo., floodway, would be endangered if the fuse-plug levee at the head of the floodway blows out, according to the testimony of Harry N. Pharr, chief engineer of the St. Francis Levee Board, testifying Sept. 13 in the damage suit against the federal government being heard in the U. S. Court of Claims at Memphis, Tenn.

SOCIETY CALENDAR

AMERICAN SOCIETY OF MUNICIPAL ENGINEERS, annual meeting, Rochester, N. Y., September 24-28.

INTERNATIONAL ASSOCIATION OF PUBLIC WORKS OFFICIALS, annual meeting, Rochester, N. Y., September 24-28.

NATIONAL COUNCIL OF STATE BOARDS OF ENGINEERING EXAMINERS, annual meeting, Portland, Ore., Oct. 3-5.

NATIONAL SAFETY COUNCIL, annual meeting, Cleveland, Ohio, Oct. 1-5.

AMERICAN WELDING SOCIETY, fourteenth fall meeting, New York City, Oct. 1-5.

INTERNATIONAL CITY MANAGERS ASSOCIATION, annual conference, St. Louis, Oct. 15-17.

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS, annual convention, Santa Fe, N. Mex., Nov. 12-15.

CANADIAN INSTITUTE ON SEWAGE AND SANITATION, first annual meeting, Toronto, Oct. 18-19.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION, twelfth annual convention, Chicago, Oct. 24-26.

HIGHWAY RESEARCH BOARD, annual meeting, Washington, D. C., Dec. 6-7.

AMERICAN ROAD BUILDERS, annual convention, Washington, D. C., Jan. 22-25.

NEW YORK SECTION, AMERICAN WATER WORKS ASSOCIATION, fall meeting, Buffalo, Oct. 11-12.

WISCONSIN SECTION, AMERICAN WATER WORKS ASSOCIATION, annual meeting, Wausau, Sept. 24-26.

MISSOURI WATER AND SEWERAGE CONFERENCE, tenth annual meeting, Carthage, Mo., Oct. 15-16.

NEW YORK STATE SEWAGE WORKS ASSOCIATION, fall meeting, Oneonta, Oct. 5-6.

Personals

Charles A. Ellis, Evanston, Ill., has been appointed professor of structural engineering at Purdue University. Professor Ellis formerly held a similar position at the State Universities of Michigan and Illinois prior to being engaged in general engineering practice for the past several years.

Randall M. Dorton, city manager of Monterey, Calif., has been appointed city manager of Long Beach, Calif., effective Oct. 1. Mr. Dorton had been city manager of Pittsburg, Calif., for five years prior to his position at Monterey.

Benjamin F. Pearson, has been appointed member of the Los Angeles, Calif. city planning commission. Until his retirement this year he had been manager of industrial relations of the Southern California Edison Co.

E. J. McCaustland, for the past 20 years dean of the college of engineering and director of the engineering experiment station at the University of Missouri, has announced his retirement from the faculty to take effect next February. Dean McCaustland is 70 years of age.

Obituary

JAMES A. MCCANN, general highway contractor, St. Louis, Mo., died Sept. 7 in that city at the age of 51.

WILLIAM N. WHITNEY, assistant chief engineer of the Rochester Gas & Electric Co., Rochester, N. Y., died Sept. 27 at the age of 43.

CHARLES H. HODGATE, head of the contracting firm of C. H. Hodgate & Co., Fall River, Mass., died at his home in that city on Sept. 13. He had been in the construction business in Fall River for 40 years and was 82 years old.

HAROLD S. GILLESPIE, chief engineer of the Cement Gun Co., Allentown, Pa., died in Philadelphia, Pa., from injuries received in a fall in a local hotel. He was 37 years of age. Mr. Gillespie had started to go downstairs in the hotel when he stumbled over his dog and fell downstairs, fracturing his skull. He was a graduate of Union College.

W. A. MCCALLA, former state highway engineer of Alabama, died Sept. 11 in Montgomery at the age of 67. He was a graduate of the University of Alabama and had served on engineering projects in Texas and Louisiana before joining the engineering staff of the Bureau of Public Roads. Following 17 months of service in France during the war, including planning and construction of several army plants, he returned to this country with the rank of lieutenant-colonel and was immediately appointed principal assistant state highway engineer of Alabama. He served in this capacity up to the death of the late W. S. Keller, when he was named state highway engineer. At the end of the administration of former Governor Brandon, Mr. McCalla entered private practice as senior member of the firm of McCalla & Kenan, Montgomery, Ala.

JAMES A. HOOKE, former director of public utilities, St. Louis, Mo., and later designer and consulting engineer on the construction of the Illinois Terminal Railroad subway and elevated line in that city, died suddenly at Columbia, Mo. on Sept. 10. He was about 60 years old. A prominent graduate of the University of Missouri, school of engineering, he had gone to Columbia to attend the opening of the school. He had retired from active engineering work about two years ago. Graduating in 1903, his first work was on the construction of the Louisiana Purchase Exposition in St. Louis and in 1907 he joined the sewer department of that city. In 1911 he was made sewer commissioner and in 1914 was promoted to director of public utilities, a position he held for 11 years. Mr. Hooke retired from this office in 1925 and entered private practice. He then became interested in the proposed large-scale railroad terminal project and when the Illinois Terminal Railroad System decided to carry out this undertaking, he was named consulting engineer on the $15,000,000 development. Shortly after this development was completed, Mr. Hooke retired from active work.

CONSTRUCTION STATISTICS OF THE WEEK

ENGINEERING awards total $27,945,000 for the week with a total of $7,079,000 for private work and $20,866,000 for public. Of the public, $17,200,000 is state and municipal and $3,666,000 federal. This is an increase of 18 per cent over the previous 4-weeks average and 15 per cent over the average week to date.

Much of this increase is due to a rise in highway awards from $3,557,000 a week ago to $8,738,000 this week. Sewerage awards increased to $1,787,000; as did industrial buildings at $1,830,000, and earthwork, irrigation and drainage at $2,558,000. Waterworks dropped back slightly to $1,128,000; bridges to $1,909,000; commercial buildings to $1,123,000; and public buildings to $4,521,000.

The larger awards include: 9-story surgical and operating building, City Hospital, Boston, Mass., $1,131,000; highway awards by Illinois, $1,229,000, by New York, $1,021,000, and by Minnesota, $1,268,000; city bridge over Missouri River on Franklin St., Washington, Mo., $558,000; Contract 105, Div. D, St. Paul-Minneapolis Sanitary District, sewer, $471,000; federal levees in Missouri, Illinois, Kentucky and Arkansas, $625,000; and 108-mi., 12-in., steel pipe line for Standard Oil Co., San Luis Obispo County, Calif., $4,000,000.

New capital for the week includes $9,312,000 in state and municipal bond sales and net reduction in PWA allotments for non-federal work of $5,501,000 for public work and an increase of $2,750,000 for private loans.

CONTRACTS

(Thousands of Dollars)

	Weekly Sept. 1933	Average Prev. 4 Weeks	Week Sept. 20 1934
Federal Government	$6,020	$6,834	$3,666
State and municipal	12,413	11,630	17,200
Total public	$18,433	$18,464	$20,866
Total private	8,236	5,244	7,079
Week's total	$26,669	$23,708	$27,945

Cumulative to date:
1933......$635,532 1934....$925,923

NEW PRODUCTIVE CAPITAL

(Thousands of Dollars)

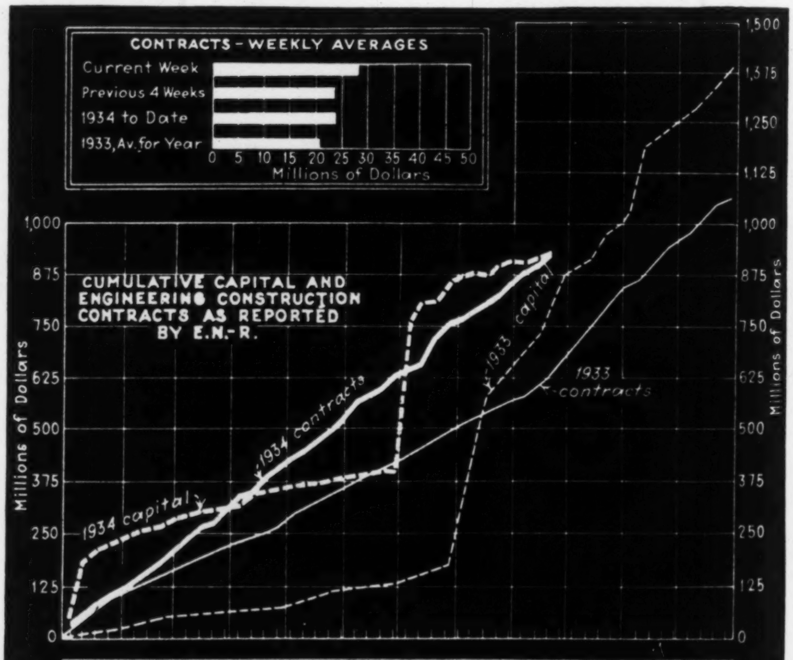
1934	Week Sept. 20	Cumulative
State and municipal	$9,312	$248,339
PWA allotments, S&M.	—5,501	596,009
RFC loans, S&M	....	9,463
Corporate issues	....	18,081
PWA allotments, private	2,750	57,022
Total, Non-Federal	$6,561	$929,014
PWA allotments, Federal Constr.	5,000	188,423
Total new capital	$11,561	$1,117,437

Cumulative to date:
1933......$800,265 1934....$929,014

Note: These figures include private bonds, and stocks sold for productive purposes; state and municipal bonds for construction; PWA loans and grants to states and municipalities, including the special highway funds; PWA private loans, and allotments for Federal construction.

INDEX NUMBER

E.N.-R.- Cost	1913 = 100	1926 = 100	E.N.-R.- Volume	1913 = 100	1926 = 100
Sept., 1934	**200.58**	**96.41**	**Aug., 1934**	**94**	**42**
Aug., 1934	198.40	95.37	July, 1934	128	56
Sept., 1933	175.48	84.35	Aug., 1933	73	32
1933 (Av.)	170.18	81.80	1933 (Av.)	102	45
1932 (Av.)	156.97	75.45	1932 (Av.)	127	56
1931 (Av.)	181.35	87.17	1931 (Av.)	220	96.5



Current Construction Unit Prices

Turkey Creek Water Project, Ponca City, Okla.

FIVE CONTRACTS were awarded early in August, 1934, for the construction of a new water supply for Ponca City, Okla.: I—Cleaning of lake site; II—Earth dam, dike and concrete highway bridges; III—Pipelines; IV—Rapid sand filter plant to treat 10 m.g.d.; V—Motor-driven high service pumping unit. The earth embankments will have a cutoff trench backfilled with puddled earth. Four alternates were asked for on 12,600 ft. of 27-in. pipeline: cast iron, steel pipe, ingot iron pipe and reinforced concrete pipe. For 5,705 ft. of 12-in. pipe the same alternates were asked for except concrete pipe. Contract was awarded on the basis of using steel pipe for both sizes. The lowest individual item bids submitted for the various classes of pipe by eleven bidders were, per ft.; 27-in. cast iron, $5.65; 27-in. steel, $4.94; 27-in. ingot iron, $5.85; 27-in. reinf. concrete, $5.60; 12-in cast iron, $2.10; 12¾-in. O.D. steel, $2.04; 12¾-in. O.D. ingot iron, $2.40.

Twenty-five bidders submitted proposals on the five contracts, some firms bidding only on one contract, others on more than one. Total bids ranged as follows: I—Cleaning of lake site, 5 bids, $9,000 to $13,800; II—Dams and bridges, 9 bids, $176,305 to $302,160; III—Pipelines, 11 bids, $77,950 to $91,612; IV—Filter plant, 5 bids, $142,962 to $157,062; V—Pumping unit, 5 bids, $2,942 to $5,000. Following are complete unit prices of the two lowest bidders on each of the five contracts. W. H. Holway, consulting engineer, Tulsa, is in charge of the new development.

CONTRACTORS AND TOTAL OF BIDS

I—Cleaning of Lake Site: (Lump sum, single item)	
A—M. E. Gillioz, Monett, Mo. (Contract)	$9,000
B—R. Craig, Oklahoma City	9,600
II—Dams and Bridges:	
C—M. E. Gillioz, Monett, Mo. (Contract)	176,305
D—J. J. Harrison, Lindsay, Okla	177,960
III—Pipelines:	
E—Smith Bros., Kansas City	
All cast iron pipe	88,030
All steel pipe (Contract)	77,950
All ingot iron pipe	90,842
F—Dobson, Humphreys & Carter, Tulsa (cast iron pipe)	80,185
Low bid on concrete pipe, Lock-Joint Concrete Pipe Co., Ampere, N. J	88,902
IV—Filter Plant:	
G—Hill & Evans, Ft. Smith, Ark. (Contract)	142,962
H—W. R. Grimshaw, Tulsa	146,120
V—Pumping Unit: (Lump sum, single item)	
J—Worthington Machinery Corp., Tulsa (Contract)	2,942
K—Moorlane Co., Tulsa	2,947

UNIT PRICES ON CONTRACTS II, III AND IV

Item	Quan.	Bidder and Unit Prices	
		C	D
II—Dams and Bridges:			
1. Clearing and grubbing	Lump sum	$1,200.00	$1,000.00
2. Earth excav., cutoff trenches, c.y.	5,000	.25	.50
3. Earth excav., bridge fdns., c.y.	1,000	2.00	.30
4. Clay puddle refill, cy. yd	5,000	.40	.30
5. Earth embankment, cu. yd	520,000	.17	.18
6. Rock riprap, Class A, sq. yd	40,000	.70	.75
7. Rock riprap, Class B. cu. yd	1,000	2.50	2.00
8. Rock excavation, cu. yd	2,000	1.50	1.00
9. Shale excavation, cu. yd	40,000	.25	.15
10. Rock excav. in trench, cu. yd	200	5.00	5.00
11. Concrete, Class A, bridges, cu. yd.	290	16.00	15.00
12. Concrete, Class A, pavement, cu. yd.	100	12.50	10.00
13. Concrete, Class B, cu. yd	610	14.50	14.00
14. Concrete, Class C, cu. yd	100	12.00	20.00
15. Steel reinforcing, lb	50,000	.04	.05
16. Steel railing, lin. ft	460	2.00	2.00
17. Misc. work at one bridge	Lump sum	500.00	750.00
18. Intake tower and outlet works	Lump sum	15,000.00	15,000.00
19. Grassing slopes of embankments	Lump sum	1,000.00	1,000.00
III—Pipelines:		E	F
1a. 27-in. cast iron pipe, lin. ft	12,600	$5.74	$5.80
1b. 27-in. steel pipe, lin. ft	12,600	4.94	5.25
1c. 27-in. ingot iron pipe, lin. ft	12,600	5.85	......
1d. 27-in. reinf. concrete pipe, lin. ft	12,600	5.60*	......
2a. 12-in. cast iron pipe, lin. ft	5,705	2.15	2.10
2b. 12¾-in. O.D. steel pipe, lin. ft	5,705	2.15	2.00
2c. 12¾-in. O.D. ingot iron pipe, lin ft.	5,705	2.40	......
3. Rock excavation, extra, cu. yd.	400	2.20	2.00
4. Blow-off connections, 8-in., each	3	95.00	70.00
5. 2-in. air valves, each	3	135.00	45.00
6. Gate valves and 10-in. meter	Lump sum	1,490.00	1,120.00
7. Concrete, cu. yd	20	10.00	15.00
8. 2-in. taps, each	10	18.00	6.00
IV—Filter Plant:		G	H
1. Earth excavation, cu. yd	2,000	$0.75	$0.50
2. Refill and grading, cu. yd	8,000	.40	.60
3. Concrete, Class A, cu. yd	630	16.70	17.00
4. Concrete, Class B, cu. yd	1,730	13.00	15.00
5. Concrete, Class C, cu. yd	70	8.00	8.00
6. Steel reinforcing, lb	300,000	.042	.045
7. Filter building and head house	Lump sum	23,000.00	16,000.00
8. 100,000-gal. wash tank	Lump sum	6,750.00	7,100.00
9. Filter equip. and inside piping	Lump sum	35,144.00	36,800.00
10. Chemical feed equipment	Lump sum	6,867.00	6,800.00
11. Mechanical mixing equipment	Lump sum	4,000.00	3,900.00
12. Outside piping and valves	Lump sum	14,550.00	17,000.00
13. Miscellaneous	Lump sum	1,780.00	2,000.00

*Submitted by Lock-Joint Pipe Co.

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Two Steel Bridges, Washington

TWO STEEL bridges, one a cantilever and the other an arch, are under construction at Deception and Canoe Passes, Skagit and Island Counties, Washington. A single contract for both structures was let late in June, 1934, by L. V. Murrow, Director of Highways, Washington. The Deception Pass bridge is 930 ft. long, consisting of one 550-ft. cantilever span, two 175-ft. anchor arms and two 30-ft. concrete approach spans. At Canoe Pass the structure, 500 ft. long, consists of one 350-ft. arch span, two 50-ft. side spans and two 30-ft. concrete approach spans. Both bridges carry a 22-ft. concrete deck and two 3½-ft. walks. The bridges are separated by 240 ft. of roadway on Pass Island. Following are complete unit prices of the three lowest bidders: (A) Puget Construction Co., Seattle, $304,755 (contract); (B) West Coast Construction Co., Seattle, $311,398; (C) Pacific Car & Foundry Co., Seattle, $334,090. Nine bids were submitted, the highest being $383,660.

DECEPTION AND CANOE PASS BRIDGES, WASHINGTON

Item and Quantity	Unit Prices		
	A	B	C
Structure excavation—3,030 cu. yd	$3.00	$5.30	$4.20
Concrete, Class A—1,190 cu. yd	18.50	18.50	20.56
Concrete, Class B—1,020 cu. yd	18.50	18.50	16.68
Concrete, Class C—1,750 cu. yd	18.50	18.50	11.62
Reinforcing steel—323,500 lb	.05	.041	.047
Structural steel—1,678,000 lb	.06	.0598	.071
Silicon steel—1,496,000 lb	.065	.066	.077
Cast steel—66,000 lb	.10	.09	.10
Copper and bronze—1,700 lb	.40	.75	.40
Cast steel drains—32	25.00	70.00	75.00
Extra cement—50 bbl	3.00	4.00	3.50
3-in. bull's eye reflectors—8	10.00	10.00	20.00

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Broadway Highway Tunnel, Oakland

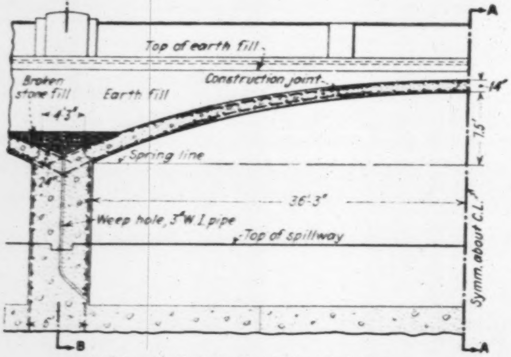
CONTRACT was awarded in June to Six Companies of California, San Francisco, for construction of the Broadway low-level highway and tunnel, 2.82 miles in length, to provide adequate and direct easterly outlets for Berkeley and Oakland, and for the greatly increased traffic anticipated on completion of the San Francisco-Oakland Bay Bridge in 1937. The main part of the project consists of a double bore tunnel 3,168 ft. long through the Berkeley Hills, and a standard 4-lane highway, 2.2 miles long, leading from the western outlet, through Temescal Canyon to the intersection of Broadway and Keith Avenue in Oakland.

The work is under the jurisdiction of Joint Highway District No. 13, Wallace B. Boggs, chief engineer, and is partially financed through PWA funds. The tunnel will consist of two parallel bores, each having a 22-ft. roadway and a 3-ft. sidewalk, accommodating 4 traffic lanes. The bores are 15 ft. apart at the portals; but are 100 ft. apart through the main portions, with three cross connections for pedestrian use.

The tunnels will be concrete lined throughout. Ventilation will be provided by fans housed in concrete structures at the portal. Three bids were received, all exceeding the engineers' estimates: (A) Six Companies of California, $3,683,931 (Contract); (B) Frazier-Davis Construction Co., and G. L. Tarlton, St. Louis, $4,394,613; (C) Silas Mason Co., New York, $4,482,498; (D) Engineers' estimate, $4,578,115. Complete unit prices follow:

COMPLETE QUANTITIES AND UNIT PRICES, BROADWAY TUNNELS

	Unit Prices			
	A	B	C	D
Excavation & Grading				
44,000 cu. yd. class A excavation	$1.20	$2.00	$1.75	$1.45
1,000 cu. yd. class B excavation	2.00	2.00	2.50	2.20
8,100,000 sta. yds. overhaul	.005	.005	.005	.005
763,000 cu. yds. grading	.33	.34	.30	.30
362,000 sq. ft. shoulders	.035	.025	.05	.02
Structural & Reinforcing				
4,420,000 lbs. reinforcing steel	.04	.044	.04	.045
445,000 lbs. structural steel	.05	.055	.048	.051
46,000 lbs. metal cribbing	.13	.15	.125	.125
5,620 lin. ft. tunnel construction (A)	325.00	465.00	475.00	340.00
200 lin. ft. tunnel construction (B)	400.00	560.00	570.00	500.00
322 lin. ft. cross adits	40.00	60.00	40.00	25.00
12,150 cu. yd class A concrete	15.50	14.50	16.50	15.00
3,200 cu. yd class B concrete	14.50	14.25	16.50	14.00
37,700 sq. ft. 8-in Portland C'm't. concrete pavement	.24	.23	.21	.18
30,400 sq. ft. 6-in Portland C'm't. concrete pavement	.18	.175	.16	.15
44,000 sq. ft. asphaltic concrete	.08	.10	.07	.08
330 cu. yd. stone or gravel for foundations	3.00	2.90	4.00	5.00
220 cu. yd. riprap	5.00	3.00	7.50	10.00
2,725 lin. ft. 6-in concrete curbs	.52	.65	.25	.60
945 lin. ft. 12-in. concrete curbs	.80	1.00	.40	1.00
46 lin. ft. 6-in. concrete curbs with guard	1.00	1.50	1.00	1.00
12,400 lin. ft. guard rail	.80	.80	.75	.65
4,300 sq. ft. concrete gutters	.25	.25	.30	.18
21,000 sq. ft cement sidewalks	.13	.15	.15	.16
724,000 sq. ft. penetration oil macadam pavement	.14	.115	.125	.12
2,020 lin. ft. 6-in cast iron piping	1.50	1.30	1.20	2.00
640 lin. ft. pipe hand rail	3.00	2.50	2.00	2.00
15 fill protectors (each)	19.00	14.00	15.00	10.00
1 lamphole 6-in	24.00	27.75	25.00	20.00
1 lamphole 8-in	26.00	30.00	25.00	20.00
3 lampholes 12-in. (each)	36.00	30.00	50.00	20.00
1 handhole	30.00	20.00	50.00	20.00
Drainage				
1,470 lin. ft. 8-in CMP culvert	1.30	1.25	1.50	1.00
210 lin. ft. 12-in. CMP culvert	2.00	2.25	2.25	1.25
3,800 lin. ft. 18-in. CMP culvert	3.00	2.80	3.00	2.17
340 lin. ft. 10-in. reinf. conc. pipe culvert	1.20	1.30	1.50	1.25
750 lin. ft. 12-in. reinf. conc. pipe culvert	1.50	1.50	1.75	1.50
430 lin. ft. 15-in. reinf. conc. pipe culvert	1.80	1.80	2.00	2.00
85 lin. ft. 18-in. reinf. conc. pipe culvert	2.00	2.10	2.60	3.00
1,470 lin. ft. 24-in. reinf. conc. pipe culvert	4.40	4.00	5.00	4.00
680 lin. ft. 36-in. reinf. conc. pipe culvert	8.50	9.00	8.50	6.00
190 lin. ft. 6-in vitrified pipe sewers	1.00	1.00	.60	.70
415 lin. ft. 8-in. vitrified pipe sewers	1.20	1.10	.75	.75
10 manholes (std. tops), each	90.00	75.00	75.00	60.00
5 manholes (inlet tops), each	100.00	75.00	75.00	60.00
4 manholes (grating tops), each	90.00	75.00	75.00	60.00
1 storm water inlet, 34-in. opening	75.00	75.00	75.00	60.00
10 storm water inlet, type "B," each	100.00	60.00	100.00	60.00
12 storm water inlet, type "C," each	80.00	50.00	75.00	60.00
4,100 lin. ft. 8-in. perforated CMP underdrains	1.40	1.75	1.50	1.25
Entrance Structures & Mech. Equipment				
Lump sum ventilation buildings, East & West structures, complete	340,000	250,000	274,000	261,000
Lump sum, ventilation equipment, furnish & install, complete	160,000	130,000	143,000	108,350
Lump sum, mechanical equipment, furnish & install, complete	60,000	50,000	58,000	34,000
Lump sum, electrical equipment, furnish & install, complete	210,000	200,000	204,000	186,120
Lump sum, carbon monoxide detectors and recorders, furnish & install, complete	15,000	12,000	16,000	16,500



Half Longitudinal Section Typical Arch Span

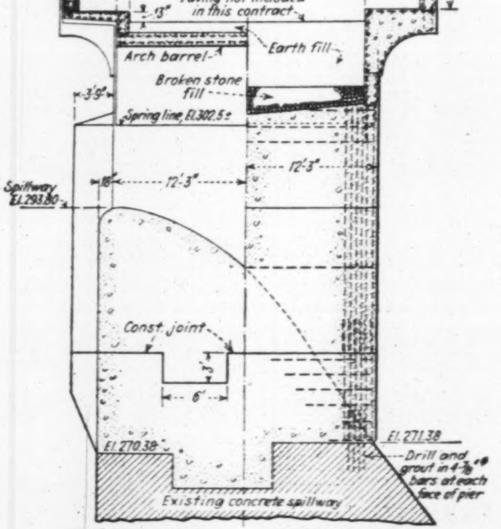
Raising a Concrete Dam

As PART of the improvements to the water supply of Reading, Pa., the old concrete gravity dam at Ontelaunee Reservoir will be raised 20 ft. to form a spillway for the new earth dam now under construction. The overall length of the spillway between abutments is 543½ ft. Surmounting the spillway will be a 23-ft. highway carried on seven concrete arches of 72½-ft. span. Contract for the new spillway on the bridge was let August 28 to the Whiting-Turner Contracting Company of Baltimore, lowest bidder. The three lowest of nine bids submitted were remarkably close; the second bid being $423 above low bid, and the third being $1,100 above the low bid of $167,415. One bidder submitted a proposal for $188,310, but the remaining five proposals were all in excess of $215,000, with the high being $234,430. The work will be under the direction of A. R. O'Reilly, chief engineer, Bureau of Water. Following are complete unit prices of the three low bidders: (A) Whiting-Turner Contracting Co., Baltimore, $167,415 (contract); (B) John H. Wickersham, Lancaster, Pa., $167,839; (C) The Pitt Construction Company, Pittsburgh, $168,517.

BID TABULATION, THREE LOW BIDDERS ON ONTELAUNEE SPILLWAY

		Unit Prices		
Item	Quan.	A	B	C
Clearing and Grubbing	Lump sum	$50.00	$375.00	$100.00
Cofferdams	Lump sum	475.00	600.00	500.00
Earth excavation, cu. yd	1,000	1.10	.90	1.00
Rock excavation, cu. yd	800	4.50	3.50	4.00
Rolled fill, except on bridge, cu. yd	4,000	.25	.45	.50
Rolled fill on bridge, cu. yd	1,500	.25	.50	.75
Stone fill on bridge, cu. yd	60	3.20	2.70	3.00
Riprap, cu. yd	200	2.00	2.50	3.00
Concrete, Class A, cu. yd	600	8.30	7.50	11.00
Concrete, Class B, cu. yd	10,000	11.60	10.38	11.00
Concrete, Class C, cu. yd	700	17.75	19.20	18.00
Concrete, Class D, cu. yd	700	18.00	34.50	22.00
Reinforcing steel, lb	280,000	.04	.03	.035
Copper flashing, lb	1,200	.33	.50	.50
Mastic expansion joint, sq. ft	600	.60	.70	.80
Curb angles, lin. ft	1,250	.25	.35	.50
Granolithic finish, sq. yd	750	.83	1.533	1.00
Flagstone	Lump sum	550.00	1,512.50	300.00
Stone masonry	Lump sum	250.00	275.00	1,800.00
Demolition concrete posts	Lump sum	50.00	150.00	100.00
Wrought iron drains	Lump sum	80.00	240.00	180.00
Storm water drains	Lump sum	335.00	752.00	500.00
Extension stems for blow-off gates	Lump sum	50.00	100.00	40.00

ELEVATION AND SECTION of raised spillway and new highway bridge, Ontelaunee Dam.



Half Section A-A Half Section B-B

CONSTRUCTION REPORTS

WATERWORKS

PROPOSED WORK

Ala., Hamilton—Municipality plans waterworks. $35,000. P.W.A. project. J. B. McCrary Co., 22 Marietta St., Atlanta, Ga., engrs.

Calif., Eureka—City approved $906,000 bond issue to supplement P.W.A. grant of $318,000 for construction of dam on Mad River and 23 mi. water supply line. $1,224,000. E. D. Gardner, City Hall, engr. C. C. Kennedy, Call Bldg., San Francisco, consult. engr. Noted Sept. 13.

Conn., Niantic—State making plans rebuilding entire water system at State Camp. $15,000.

Ill., Granite City—City application for $1,822,000 P.W.A. loan and grant for municipal waterworks and distribution system and light and power plant has been denied by Federal Pub. Wks. Administration on grounds that the proposed facilities would be a duplication of present private system, etc. Noted June 22, 1933.

La., Ringgold—City plans waterworks improvements, incl. surface reservoir, wells, pumphouse, distribution system, etc. $30,000. P.W.A. loan approved. F. P. Joseph, Glenmora, engr. Noted May 17.

La., Sunset—City plans waterworks, deep well, pumphouse, elevated storage tank, distribution system, meters, fire equipment. P.W.A. granted $29,000 loan. J. B. McCrary Co., Marietta St., Atlanta, Ga., engrs. Noted Feb. 22.

Massachusetts—Salem and Beverly Water Supply Bd., City Hall, Salem, plans Wenham Lake water supply construction in North Beverly. Bd. Aldermen of city of Beverly have taken favorable action on $100,000 bond issue to take care of Beverly's share of material and equipment costs of above. Final action will be taken at next meeting. Project will be done under E.R.A. and not P.W.A. as first contemplated. Entire project will cost approximately $1,000,000 and will include pumping station and chemical building. Salem has also reported favorable action. Metcalf & Eddy, 1300 Statler Bldg., Boston, engrs.

Mo., St. Charles—City voted $65,000, for 2 story, 70x80 ft., rein.-con., brick water filtration plant, filter equipment and water extensions. $65,000. Russell & Axon, 4903 Delmar Blvd., St. Louis, engrs. P.W.A. grant and loan allotted. Noted Aug. 23.

Mont., Billings—City plans water system. Black & Veatch, 700 Mutual Bldg., Kansas City, Mo., engrs.

Mont., Stevensville—Town, as prior bond election declared illegal, bids were not opened Aug. 27, for improving waterworks. Will hold another election. R. Hale, Missoula, engr. $55,000.

O., Middleport — Plans waterworks system. P.W.A. loan and grant of $36,000 approved. C. J. Simon Van Wert, engr.

Tex., Dallas—City, c/o J. N. Edy, mgr., waterworks improvements. $840,000. P.W.A. allotment rescinded. J. B. Winder, Dallas, engr.

Wash., Okanogan—City soon takes bids improving waterworks system. $15,000. S. T. Moore, mayor. Noted Apr. 12.

Ont., London—Public Utilities Comn. plans new reservoir in East London. $100,000. Gore, Nasmith & Storrie, Metropolitan Bldg., Toronto, consult. engrs. Noted Aug. 23.

Ont., Riverside—Municipal Council, making plans water system extension.

BIDS ASKED

Calif., Los Angeles—Oct. 11 (extended date), by Metropolitan Water Dist., 306 West 3rd St., F. E. Weymouth, engr., constructing 110.62 mi. Colorado River Aqueduct, involving constructing cut-and-cover concrete conduit, concrete-lined canal, precast and monolithic concrete siphons, steel pipe siphon and appurtenant works of the Colorado River Aqueduct. $35,000,000.

Ky., Drakesboro—Oct. 2, by City Clerk, complete waterworks system, Contr. 1, general construction and installation; Contr. 2, furnishing pumps and motors and automatic controls for pumps; Contr. 3, furnishing hydrants and valves; Contr. 4, furnishing c.i. pipe and special castings; Contr. 5, furnishing meters; Contr. 6, furnishing, installing tank and tower; Contr. 7, furnishing, installing chlorinator; Contr. 8, furnishing service connections. Wescott-Thornton & Sargent, Cary Bldg., Owensboro, engrs. P.W.A. project.

Md., Baltimore—Oct. 3, by Bd. Awards, elevated water tank and pumping equipment at Baltimore City Hospitals. Bureau Water Supply, Municipal Bldg., engr.

Mass., Townsend—Sept. 27, by Bd. Water Comn., Town Hall, constructing pumping station, grading, bridges, etc. $150,000. P.W.A. project. H. B. Boynton, water comr. Whitman & Howard, 89 Broad St., Boston, engrs.

Mass., Worcester—See "Contracts Awarded."

Mich., Detroit—Oct. 2, by C. J. Plagens, secy. Dpt. Water Supply, Waterworks Project RC-27, incl. dredging in area adjacent to waterworks, removal of intake pipe, and restoration of facing for dykes for Intake Lagoon at easterly end of Belle Isle; dredging 3,000 cu.yd. material from river bottom; removal of 800 ft. 6 ft. diam. wrought iron pipe from river bottom, near Waterworks Park; furnishing, placing on dykes of Intake Lagoon, 3,000 tons stone rip rap; furnishing, placing on dykes of Intake Lagoon, on Easterly end of Belle Isle, 6,500 tons of stone or precast concrete rip rap. P.W.A. project. G. H. Fenkell, genl. mgr. Noted Aug. 16.

Mo., Hayti—Oct. 1, by F. Morgan, Jr., city clk., waterworks improvements and extensions, incl. 8,000 ft. c.i. pipe, 10 hydrants, cement gravel for 75,000 gal. storage well, machinery and equipment for filter plant, etc. $22,800. P.W.A. project. W. A. Fuller Co., 2916 Shenandoah Ave., St. Louis, engrs. Noted July 19.

N. J., Cape May—Sept. 25, by Mayor and City Council, City Hall, 700,000 gal. elevated steel water storage tank with foundations, piping, connections, appurtenances. P.W.A. project. Remington, Vosbury & Goff, 509 Cooper St., Camden, consult. engrs. Noted Aug. 16.

N. Y., Brocton—See "Contracts Awarded."

N. C., Richlands—Sept. 28, by Town, N. Cox, mayor, waterworks system, incl. 300 lin.ft. 8 in. and 7,700 lin.ft. 6 in. c.i. pipe, 7,400 lin.ft. 2 in. and 2,500 lin.ft. ¾ in. cement lined pipe, 13 hydrants, 100,000 gal. elevated steel water tank, 2 pump houses, etc. Est. $31,000. P.W.A. project. W. G. Freeman, High Point, engr.

O., Athens—Sept. 26, by City, Contr. "A" part 1, structures, incl. 200,000 gal. concrete reservoir, pump house substructure, and 1 story, 31x42 ft. brick superstructure, Part 2, equipment, incl. 2 H.S. centrifugal pumps, 7 well turbines, electrical work, piping and valves; Contr. "B" distribution system extensions, incl. 5,300 ft. 6 and 8 in. pipe with valves and hydrants. Former bids rejected. Burgess & Niple, 568 East Broad St., Columbus, engrs.

O., Fairport—Sept. 28, by J. Rendrick, mayor, waterworks system (1) 1,525 ft. 16 in. and 1,525 ft. 20 in. intake, submerged steel head, 60 tons stone around intake head, 20 cu.yd. concrete, sheet steel piling, 72 in. steel caisson (2) 200,000 gal. elevated steel tank (3) filtration plant, 1,040 cu.yd. excav., 71 cu.yd. concrete, 70 tons steel reinforcement, 63,480 cu.ft. building, $95,000. Richards, Richardson & Lauer, 22 South St., Painesville, engrs. Noted Apr. 26.

S. C., Bethune—Sept. 26, by Town Council, constructing complete waterworks system, incl. distribution system pipe lines, valves, hydrants, meters, etc., tank found., 1 deep well, 1 deep well pump and building, and one 75,000 gal. steel storage tank on 100 ft. tower. $26,000. P.W.A. project. Ryan Eng. Co., Columbia, engrs.

S. C., Pinewood—Sept. 25, by Town Council, complete waterworks system, incl. distribution system, pipe lines, valves, hydrants, meters, etc., tank found., 1 deep well, 1 deep well pump and buildings, 75,000 gal. steel storage tank and 100 ft. tower. $24,000. P.W.A. project. Ryan Eng. Co., Columbia, engr.

Tex., Marshall—City, c/o H. J. Graeser, mgr., taking bids and open same about Oct. 2, reservoir improvements, incl. rein.-con. slab roof, piling, etc. $23,000. P.W.A. project. W. C. Albright, Marshall, engr. Noted Apr. 26.

Vt., Vergennes—Sept. 28, by Town, G. W. Stone, elk., 7 mi. 10 in. c.i. pipe lines, earthen dam, smaller dam and intake, meter and chlorination house, 500,000 gal. steel standpipe and appurtenances. P.W.A. project. $156,000 allotment. Barker & Wheeler, 36 State St., Albany, N. Y., engrs. Noted Dec. 21.

CONTRACTS AWARDED

†Calif., San Diego—See "Sewerage and Waste Disposal."

Colo., Longmont—City Council, City Hall; pipe line and filter plant, to Stearns-Rogers Mfg. Co., 1720 California St., Denver, $51,412. Bids Aug. 28.

Ill., Knoxville—City, pump house and reservoir roof, to O. Linner, Galesburg, $2,013; centrifugal pump, valves, meter and piping, to Dayton-Dowd Co., Quincy, $2,282. P.W.A.

Ill., Ramsey—City, constructing waterworks, distribution system, incl. 10x10x9 ft. brick pump house, 50,000 gal. tank on tower, 17,270 ft. 4- to 8-in. c.i. pipe, 24 valves and boxes, etc., to E. M. Scheflow, Elgin, $29,093; well, to Henry Rees & Son, Quincy, $1,250. Bids Aug. 31. P.W.A. Noted Aug. 23.

Mass., Attleboro—City, Water Dpt., City Hall, constructing water system, consisting of subterranean wells and pipe lines, to Layne-Bowler, Inc., Statler Bldg., Boston, $35,096. Bids Aug. 27, awarded Sept. 10.

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Mass., Quincy—City, Water Dpt., City Hall, constructing steel standpipe and elevated tank to Pittsburgh Des Moines Steel Co., 385 Dearborn St., Chicago, Ill., $19,780. Bids Sept. 4 awarded Sept. 7. Noted Aug. 16.

Mass., Worcester—City, Water & Sewer Dpt., City Hall, constructing watermains in Chandler and May St. Sections, day labor. **P.W.A.** Est. $139,000. R. G. Lingley, city engr.

Mich., Grand Rapids—G. C. Dillman, dir. P. Serv., material and equipment for waterworks improvements and additions, tank, to Pittsburgh-Des Moines Steel Co., Neville Island, Pittsburgh, Pa., $21,530•••exciter, to Owen-Ames-Kimball Co., Grand Rapids, $3,270••• fence, to Haven-Busch Co., Grand Rapids, $1,674•••altitude valves, to Ross Valve Mfg. Co., 6 Oakwood Ave., Troy, N. Y., $2,265. Grand total $28,739. **P.W.A.** Bids Sept. 12.

N. Y., Brocton—Village installing 3½ mi. c.i. pipe line from Bear Lake to augment municipal water supply, day labor under supervision of Hill & Hill, engrs., North East, Pa. To exceed $12,000.

N. Y., Comstock—Dpt. Correction, State Office Bldg., Albany, water supply at Great Meadow Prison, to Adams Bros. Constr. Co., Glens Falls, $14,280. Bids Aug. 21.

N. Y., Sonyea—See "Sewerage and Waste Disposal."

N. Y., Willard—Dpt. Mental Hygiene, State Office Bldg., Albany, water softening equipment, at Willard State Hospital, to John W. Danforth, 72 Ellicott St., Buffalo, $16,671. Bids Aug. 15. Noted Aug. 9.

N. C., Lenoir—Town, W. J. Lenoir, mayor, and Bd. City Comrs., constructing and installing waterworks improvements incl. 26,000 ft. 6 in. and 7,000 ft. 10 in. pipe, hydrants, and valves, to Boyd & Goforth, Inc., Builders Bldg., Charlotte, $51,541. **P.W.A.** Bids Aug. 22. Noted Aug. 16.

N. C., Lexington — Town, Mayor and Bd. Aldermen, waterworks system, to North Eastern Constr. Co., Winston Salem, $85,000. **P.W.A.** Bids Aug. 21. Noted July 26.

N. C., Randleman—Town, C. W. Hilliard, mayor, water and sewerage systems, to A. H. Guion Co., Gastonia, $170,375; tanks, to R. D. Cole Mfg. Co., Newman, Ga., $6,285. **P.W.A.** Bids Aug. 28.

O., Grafton—Village, 100,000 gal. elevated steel plate tank, 125 ft. high, to Chicago Bridge & Iron Wks., Midland Bank Bldg., Cleveland, $8,160•••filter building, 1,570 ft. 4- to 8-in. c.i. watermain, and filter equipment, to Steinle-Wolfe Constr. Co., Fremont, $4,954 and $5,562 respectively. Grand total $18,676. **P.W.A.** Bids Sept. 1, awarded Sept. 6.

O., McArthur—Village, waterworks, sewage treatment and sewer lines, to J. A. Hickey, Inc., Prospect-Fourth Bldg., Cleveland, $92,000. Bids Aug. 17, awarded Aug. 29. **P.W.A.**

Pa., Sykesville—Borough, Contr. 1, pipe, for waterline from here, to Du Bois, to U. S. Cast Iron Pipe & Fdry. Co., Koppers Bldg., Pittsburgh, $27,647•••Contr. 3, constructing 5½ mi. 8 in. transmission line and appurtenances, to Pittsburgh Des Moines Steel Co., Neville Island, Pittsburgh, $18,902. **P.W.A.** Contr. 2, for gate valves, boxes, etc., deferred. Noted May 3.

S. D., Frederick—Town, furnishing materials and erecting one 50,000 gal. steel tank on 100 ft. steel tower and furnishing, installing 110 cold water meters, to Chicago Bridge & Iron Wks., 37 Van Buren St., Chicago, Ill. **P.W.A.** Noted Aug. 23.

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†Federal Government.

Waterworks (Continued)

Tex., Port Lavaca—City, c/o F. M. Dudgeon, mayor, constructing waterworks improvements, pumping equipment, supply mains, fire hydrants, repairs, to Brown & Root, Inc., 4300 Calhoun Rd., Houston, $46,816; wells, to Layne-Texas Co., Houston, $7,728. Est. $54,000. **P.W.A.**

Wis., Seymour—City, to J. B. Clow & Sons, 201 North Talman Ave., Chicago, Ill., 4 in. c.i. pipe 59c.; 6 in. 85.75c.; 8 in. $1.25; 4 in. 50.75c.; 6 in. 73.75c.; 8 in. fittings $1.06; 4 in. at $1.09***to A. P. Smith Mfg. Co., East Orange, N. J., hydrants, valves, valve boxes $3,026***to Kehreim Bros., Inc., 2555 North 19th St., Milwaukee, hauling pipe, digging trenches, laying pipe $47,558***to E. Smith, West DePere, pump house and reservoir, $4,550***to Chicago Bridge & Iron Co., 37 West Van Buren St., Chicago, Ill., elevated steel tank and tower, $7,170***to Fossbender Bros., Fond du Lac, deep well $2,000***to Economy Pump Co., 3441 West 48th Pl., Chicago, Ill., general service pump and motor and auxiliary gas engine pump $1,261***to Arft Killoren Electric Co., Appleton, electric automatic control panel and equipment for control of pumps $1,333***to Mueller Co., Decatur, Ill., corp. stops, etc. $1,340***to Republic Flow Meter Co., 2240 Diversey Ave., Chicago, Ill., flow meter $316. Bids Sept. 6. Noted Aug. 23.

SEWERAGE AND WASTE DISPOSAL

PROPOSED WORK

Conn., Danbury—City has been authorized by Bd. Councilmen to make application to Federal Government for grant and loan to finance sewer improvements. $53,000.

Idaho, Pocatello—City election Oct. 25, $12,000, vitr. tile or concrete storm sewer, catch basins, and manholes. Total cost $26,000. R. F. Hamilton, city engr.

Ia., Waverly—City soon takes bids sewage disposal plant, equipment, auxiliary pipe and sewer connections. $90,000 P.W.A. loan and grant. Engineer not appointed. Noted July 20, 1933.

Md., Hurlock—Town, Com. R. V. Layton, mayor, soon takes new bids 4 mi. 8- to 12-in. terra cotta sewers and manholes, disposal plant. Former bids rejected. J. S. Howard, 20 East Lexington St., Baltimore, engr. Noted Sept. 6.

Mich., Birmingham—City plans concrete trunk line sewer down Rouge River Valley to site of proposed sewage disposal plant at Fourteen Mile Rd., Southfield Twp. $77,000. P.W.A. loan and grant to be asked on new system in revised application. J. W. Parry, city mgr. Noted Mar. 22.

O., Massillon—City plans sewers and treatment plant. P.W.A. loan and grant of $592,000 approved. C. E. Rice, city engr. G. B. Gascoigne Co., Leader Bldg., Cleveland, engrs.

Wis., Alma—City making plans sewerage system and disposal plant. R. Cramer & Sons, Milwaukee, engrs. P.W.A. project. Noted Nov. 30, 1933.

BIDS ASKED

Ia., Sioux City—Sept. 28, by City, storm sewers in various streets. $108,000. P.W.A. project. L. Hintgen, city engr.

Md., Baltimore—Sept. 26, by Bd. Awards, Storm Water Sewer Contr. 181, along Broening Hy. Bureau Sewers, Municipal Bldg., engr.

Md., Cumberland—Sept. 25, by City Comrs., City Hall, sewer interceptors. $300,000. Gannett, Easton & Fleming, 600 North 2nd St., Harrisburg, Pa., engrs. P.W.A. project.

Mich., Charlevoix—Oct. 8, by City Clerk, sewer improvements, incl. Div. A, 4,600 lin.ft. 8- to 21-in. sewers, river crossing, 2 small pumping stations, $25,000; Div. B, sewage treatment plant, settling tanks, sludge digestion tank, sludge drying beds, building housing settling tanks, sludge pumping station, garage and offices, $35,000-$40,000; Div. C, sludge collectors, incl. furnishing, erecting complete in place of equipment for collecting of sludge in rectangular settling tanks; Div. D, digestion tank cover, incl. furnishing, erecting complete in place of floating type cover for 28 ft. inside diam. circular sludge digestion tank; Div. E, dewatering digested sludge. Greeley & Hansen, 6 North Michigan Ave., Chicago, Ill., engrs. Noted Sept. 14.

N. Y., Woodridge—Oct. 10, by B. Cosor, Esq., atty. for Bd. Village Trustees, Mountaindale Rd., constructing sewers and sewage treatment works. A. H. Okun, 79 High St., Monticello, consult. engr.; adv. E.N.-R. Sept. 20. Plans and specifications on file in Searchlight Dpt. Noted Aug. 16.

N. D., Fargo—Sept. 27, by C. O. Jorgenson, city and constructing complete sewage disposal plant, collector sewerage system, incl. 22,952 ft. 8- to 36-in. vitr. pipe; 6,800 lin.ft. 8- to 16-in. c.i. mains and 2,600 lb. special castings, and building over trickling rock filter. $785,000. P.W.A. project. W. P. Tarbell, city engr. Buell & Winter Eng. Co., 503 Insurance Exch. Bldg., Sioux City, Ia., consult. engrs.

Pa., Dauphin—Oct. 1, by Borough Council, 8,000 lin.ft. 8- to 10-in. terra cotta sanitary sewerage system. Former bids rejected. E. W. Cowden, Harrisburg, engr. Noted Aug. 23.

S. C., Rock Hill—Sept. 27, by Mayor and City Council, Rock Hill, T. C. Marshall, mgr., sewer improvements, incl. furnishing 497.25 tons Class A iron pipe 10- to 30-in. (inclusive); 27,223 lin.ft. 12- to 27-in. salt glazed vitr. sewer pipes; excavation for and laying 38,100 ft. c.i. and vitr. clay pipe 10- to 30-in. (inclusive) and backfilling trenches, incl. 1,665 ft. c.i. pipe in tunnel; 72 manholes, constructing sewerage pumping station and installing pumping equipment. $263,000. P.W.A. project. W. C. Olsen, Raleigh, consult. engr. Noted July 26.

Tex., Houston—Sept. 26, by City, c/o O. F. Holcombe, mayor, constructing 42 in. outfall relief line sewer from Willow St. Pumping Plant to North Side Sewage Treatment Plant, involving 10,390 ft. rein.-con., 1,465 ft. double rein.-con. and 740 ft. special rein.-con. 42 in. pipe. J. M. Nagle, city engr. P.W.A. project. Noted Aug. 9.

Tex., Marshall—City, c/o H. J. Graeser, mgr., taking bids and opens same about Oct. 2, sewage disposal plant addition, Imhoff tanks, settling basins, 2 in. water lines, etc. Est. $143,000. P.W.A. project. Montgomery & Ward, Harvey-Miller Bldg., Wichita Falls, engrs. Noted May 31.

CONTRACTS AWARDED

†Calif., San Diego—Con. Q.M., Rockwell Field, sewers, waters and other utilities, to serve 7 new hangars on North Island, Rockwell Field, to E. C. Nickel, 915 Micheotoreno St., Los Angeles, $29,790. Bids July 30.

Conn., New Britain—City, 42 in. brick sewer East St. from Town line to South St., 36 in. line to Landers Ave., 33 in. concrete to Bingham St., 30 in. concrete pipe line Ellis St. and 27 in. concrete pipe line to Henry St., to be done by FERA. Est. $81,000. FERA project. $49,000 by city for materials and $32,000 appropriated by FERA. G. Moelleur, City Hall, engr.

Ia., Cedar Rapids—City Council, constructing Sects. G and H, sewage disposal plant, to Iowa Mfg. Co., Cedar Rapids, $26,900 and $17,300 respectively; 3rd unit, to Pacific Flush Tank Co., 4241 Ravenswood Ave., Chicago, Ill., $32,300. Grand total $76,500. **P.W.A.** Bids Sept. 6.

Ia., Clarion—City, constructing sewerage disposal plant and treatment plant, to A. F. Mathis, Valley Junction, $29,502. Bids Sept. 12. Noted Sept. 6.

Ia., Forest City—City, constructing sewage treatment and disposal plant, to O. Gjellefield Constr. Co., Forest City, $39,654. Est. $40,000. **P.W.A.** Bids Sept. 12. Noted Sept. 6.

Md., Berlin—Mayor and City Council, constructing sanitary sewerage system, Contr. 1, sewers, to Virginia Eng. Co., Newport News, Va., $81,898; Contr. 2, sewage disposal plant, to George & Lynch, $11,700. Noted Aug. 23.

Minn., St. Paul—Minneapolis-St. Paul Sanitary Dist., A. G. Bastis, chn., 1923 University Ave., constructing Contr. 106A, Div. A, Job 110A and 100A; for proposed joint Twin City Sewage Treatment Plant at Pig's Island Lake, incl. dredging 125,000 cu.yd. in Mississippi River and placing embankment, to LaCrosse Dredging Co., 425 Plymouth Bldg., Minneapolis, $34,500. **P.W.A.** Bids Sept. 5. Noted Aug. 23.

Minn., St. Paul—Minneapolis-St. Paul Sanitary Dist., A. G. Bastis, chn., 1923 University Ave., constructing intercepting sewer and shaft, Contr. 105, Div. D, Job 400, incl. 5,300 lin.ft. rein.-con. tunnel in sandrock from Victoria St. along St. Anthony to Western Aves. and sinking 8 ft. x 12 ft. rectangular shaft 178 ft. deep or 6 in. circular shaft, to Frazier-Davis Constr. Co., 1319 Macklind Ave., St. Louis, Mo., $471,333. **P.W.A.** Bids Sept. 10. Noted Sept. 6.

Mo., Springfield—City, constructing Bond Issue Item 21, part of Jordan Valley Sewer Drainage Project Flood Control, to Lay Contr. Co., North Kansas City, $52,007. Est. about $60,000. Bids Sept. 4. Noted Aug. 30.

N. Y., Cedarhurst—Municipality, sewage disposal plant, to Gifford Constr. Co., 161-10 Jamaica Ave., Jamaica, $121,500; laying pipes, catch basins, etc., for sanitary sewerage system, to Andrew Weston Co., Woodmere, $296,944. **P.W.A.** Bids Sept. 4.

N. Y., Long Island City—G. U. Harvey, pres. Queens Boro, Queens Subway Bldg., to A. Catapano, 36 Ashford St., Brooklyn, sewers in 23rd Ave. $13,184; in Linden Blvd. $69,343***to J. Ferraro, 97-46 88th St., Woodhaven, 77th St. $530***to F. Soverio, 109-53 Farmers Ave., Hollis, in Cooper Ave. $5,987***to Oakhill Contg. Co., 40-05 30th Ave., Horace Harding Blvd. $38,582***to Belfatto Constr. Co., 147-42 109th Ave., Jamaica, in Baldwin Ave. $451***to Palmo Constr. Co., 105-12 101st Ave., Ozone Park, 107th Ave. $3,983; 116th Ave. $4,580; 108th Dr. $5,087***to Marmoth Constr. Co., 94-14 108th Ave., Jamaica, 114th Ave. $8,422***to J. Ferraro, 97-46 88th St., Woodhaven, 193rd St. $1,852***to Clemente & Pinepuks, 115-13 158th St., Jamaica, 200th St. $1,042***to Mannino & Pittari, 283 86th St., Brooklyn, Dunkirk St. $26,958. Grand total $180,001. Noted Aug. 23.

N. Y., New York—S. Levy, pres. Manhattan Boro, Municipal Bldg., sewers in 12th Ave., to Cleverock, Inc., 420 Lexington Ave., $12,871. Bids Aug. 9.

N. Y., Sonyea—Dpt. Mental Hygiene, State Office Bldg., Albany, sewers, water lines, to Freyn Bros. of Michigan, 1708 Lafayette Blvd., Detroit, Mich., $26,660. Bids Aug. 9. Noted Aug. 23.

O., McArthur—See "Waterworks."

†Va., Quantico—Yards & Docks, Navy Dp Wash., D. C., completion sewerage drainage a water systems at Marine Base, to J. L. Powe Bennettsville, S. C., $10,775.

Wis., Cudahy—City, storm and relief sew in various streets, to General Contractors, I 494 North 49th St., Milwaukee, $62,331. P.W. Bids Sept. 5.

Wis., Janesville—City, general contract s age treatment plant, to T. S. Willis, Janesvi $70,799***electrical work, to Westingho Electric & Sales Co., Janesville, $3,384*** plumbing, heating, to E. B. Korst, Janesvi $18,574***switchboard, to Cutler-Hammer 315 North 12th St., Milwaukee, $5,654. Gra total, $98,411. **P.W.A.** Bids Aug. 31. No Aug. 23.

BRIDGES AND GRADE CROSSINGS

PROPOSED WORK

Ala., Bridgeport—Jackson Co. soon tak bids bridge over Island Creek, near here, $30,000. War Dpt. approved plans.

California—See "Unclassified."

Connecticut—State, State Hy. Dpt., plans st concrete bridge, Waterford, $142,000 loan a grant; Bolton Bridge, $135,000, federal gra $45,000. J. A. Macdonald, State Hy. Dpt Hartford, comr.

Ia., Hampton—Franklin Co. rejected bids 1 wood pile bridges, one 3 span I-beam bridge with 6 creosoted wood approaches. Will readverti Noted Aug. 30.

Pennsylvania — State Hy. Dpt., Harrisbur plans widening bridge and concrete paving 3 m Frankford Ave. from Pennypack Creek Poquessing Creek, Phila., Philadelphia Co. $300,000.

Pa., Garland—Pennsylvania R.R. Co., Broad St. Sta., Phila., T. J. Skillman, ch. engr., plans eliminating grade crossing, east of here. T exceed $17,500.

Pa., Reading—Pub. Serv. Comn., authorized Reading Company, Baer Bldg., to proceed with plans and specifications for elimination of grade crossing on Tremont Branch in North Lebanon Twp., Lebanon Co., north of Westmont Station to replace wooden bridge destroyed by fir Plans provide for single span structure, st deck tresses, concrete floor and concrete masonry abutments. $25,000. Private plans.

BIDS ASKED

Iowa—Sept. 25, by State Hy. Comn., Ame constructing 1 pipe and 5 box culverts on NRM-27, Primary Rd. 3, Appanoose Co.; 7 box and 2 corrugated metal pipe culverts and bridge on Secondary Rd. southeast of Exira, NRS-478B, Audubon Co.; 19 concrete pipe culvert extensions, 13 box culverts, extensions, 2 bridges on Secondary Rd. west of LaPorte, NRS-43 Black Hawk Co.; bridge on Primary Rd. 10 NRH 502, Butler Co.; 27 concrete pipe and 9 box culverts, extensions, FAB-490, Primary Rd. 3 Dickinson Co.; 6 concrete pipe and 10 box culverts, FAB-440, Hardin Co.; rebuilding timber bridge, and constructing 3 I-beam bridges on Primary Rd. 37, FAB-476, Harrison and Shelby Counties; 4 concrete pipe and 1 box culverts, NRH 504, U. S. Rd. 169, Kossuth Co. 11 pipe and 14 box culverts and bridge on Primary Rd. 16, NRH 373, Lee Co.; 3 bridges on Primary Rd. 37, NRH 426, Monona Co.; 5 corrugated pipe, 13 concrete pipe and 9 box culverts on Secondary Rd. from Sharpsburg west, NRS-486, Taylor Co.; 780 ft. guard rail and 8 end anchors on Primary Rd. 59, F-367, Breme Co.; 14,800 ft. guard rail and 20 end anchors F-347, Clayton Co.; 2,200 ft. guard rail an 8 end anchors on U. S. Rd. 18, F4-41, Floy Co.; 2,050 mi. guard rail and 12 end anchor F-139, Hancock Co. P.W.A. project. F. R White, ch. engr.

Mass., Lawrence—Sept. 25, by Commissioners Essex Co., Court House, Salem, tearing down present bridge and rebuilding, constructing superstructure of Falls Bridge, consisting of removing present bridge, remodel tops of present piers and abutments, construct new 597 ft. long deck type bridge of four lines of steel girders carrying rein.-con. slab with 2 in. asphalt wearing surface, providing 40 ft. roadway and two 8½ ft. sidewalks with concrete rails, regrade an pave approaches. R. R. Evans, Salem, co. engr. Noted Sept. 6.

Miss., Senatobia—Oct. 1, by Bd. Supervs. Tate Co., M. S. Dougherty, clk., Courthouse Bldg steel bridge over West Canal of Senatobia Creek on Senatobia-Looxahoma Hy.

Mass., Worcester—Sept. 26, by City, E. W Jankins, street comr., City Hall, relocating widening 2 concrete abutments, steel superstructure bridges, at Plantation St. and Foster and Union Sts., also rebuilding approaches. To exceed $60,000. P.W.A. project. R. G. Lingley, city engr. Noted Apr. 19.

Missouri—Sept. 28, by State Hy. Dpt., Jefferson City, constructing bridges in Andrew, Atkinson, Nodaway, Clinton, Livingston, Marion Jackson, Montgomery, Jerry, Washington, Jasper Howell, Oregon, Texas, Butler and New Madrid Counties. T. C. Cutler, ch. engr.

New Jersey—Oct. 1, by State Hy. Comn., Trenton, constructing bridge and approaches at

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†Federal Government.

Bridges, etc. (Continued)

crossing of Central R.R. of New Jersey and completing approaches at Delaware, Lackawanna & Western R.R. on Route 30, Sect. 8A, Hampton, Hunterdon Co., incl. 3,250 ft. bank, 577 cu.yd. foundation, 6,277 cu.yd. earth and 200 cu.yd. rock excav. A. L. Grover, ch. clk.

North Carolina—See "Streets and Roads."

Tex., Brownsville—Floyd & Lockridge, engrs., Petroleum Tower Bldg., Dallas, taking bids repairing bridge pier over Rio Grande River, involving 224,000 lb. steel sheet piling, 500 cu.yd. excav. for Gateway Bridge Co., Brownsville.

Wisconsin—See "Streets and Roads."

CONTRACTS AWARDED

Illinois—Dpt. P. Wks. & Buildings, Div. Hys., Springfield, 2 substructures for Sister Creek bridges, to W. Wells & Sons, Quincy, $15,657 ***bridge and substructure bridge in Fulton Co., to Jansen & Schaefer, Pekin, $24,840*** superstructure same bridge, to Continential Bridge Co., 343 South Dearborn St., Chicago, $8,899***2 bridges in Schuyler and Fulton Counties, to Airey Constr. Co., Oak Park, $21,041***3 substructures and 3 superstructures bridges in Clinton Co., to J. Mackler & Co., Chicago Heights, $31,656 and $66,654 respectively***2 superstructures in Fulton Co., to Michaelman Steel Constr. Co., Quincy, $12,105 ***6 bridges in Schuyler Co., to Richardson Constr. Co., Decatur, $39,491***2 bridges Pike Co., to Illinois Steel Bridge Co., Jacksonville, $30,498***3 bridges and culvert LaSalle Co., to A. P. Munson, Marion, Ia., $7,493. Grand total $258,334. Bids Aug. 28.

Iowa—State Hy. Comn., Ames, culvert and bridge in Louisa Co., to A. Melberg, Cedar Rapids, $14,658***overhead crossing on same road, to A. Olson Constr. Co., Waterloo, $45,093*** bridge in Pottawattamie Co., to Wickes Eng. & Constr. Co., 1441 Bluffs St., Des Moines, $26,182 ***overhead crossing structure on same road, to Jensen Constr. Co., Kimballton, $57,744*** 3 culverts on same road, to S. C. Anderson, Des Moines, $13,013. Grand total $158,689. **P.W.A.** Bids Aug. 28. Noted Aug. 23.

Maine—State Hy. Comn., Augusta, L. D. Barrows, ch. engr., Chandler River Bridge, Jonesboro, involving 1,205 cu.yd. rein.-con., to R. Giovannucci, Pittsfield, $32,120. Noted June 14.

Md., Baltimore—Geo. A. Fuller Co., general contractors, Munsey Bldg., Wash., D. C., reinforcing steel for Bath St. Viaduct, for State and City, Federal Reserve Bank Bldg., to American Bridge Co., Mercantile Trust Bldg.; premixed concrete, to Arundel Brooks Concrete Corp., 941 Fell St. Noted Aug. 23, under "Contracts Awarded."

Mass., Boston—C. J. Carven, comr. Dpt. P. Wks., City Hall Annex, repairing, reconstructing Northern Ave. Bridge, rein.-con. abutments, structural steel superstructure, revolving type over Fort Point Channel, to M. F. Gaddis, 6 Beacon St., Boston, $257,790. **P.W.A.** Noted Aug. 9.

Minnesota—State Hy. Dpt., St. Paul, constructing Bridge 5407, near Plummer, Red Lake Co., to J. Schmidt, St. James, $11,526***Bridge 5382, S.P. 14-7-3501, near Courtland, Nicollet Co., to J. Rundquist & Son, 2123 Water St., Duluth, $19,287***and underpass structure Bridge 5062, S. P. 16-9-30-3, at Austin, Mower Co., to M. E. Souther & C. C. Pagenhart, 1528 Branton St., St. Paul, $44,164. Grand total $74,977. **P.W.A.** Bids Sept. 7.

Mo., Washington—City, substructure for rein.-con., steel vehicular bridge over Missouri River, foot Franklin St., to Missouri Valley Bridge & Iron Co., Leavenworth, Kan., $212,188; superstructure, to Stupp Bros. Bridge & Iron Co., 3800 Weber Rd., St. Louis, $345,483. P.W.A. allotted $428,000 grant and loan. **P.W.A.** Bids Sept. 7, awarded Sept. 14.

New York—A. W. Brandt, comr. Hys., Albany, bridges in Rensselaer Co., to I. M. Luddington's Sons, Inc., 45 Exchange St., Rochester, $96,882 est. $103,627; bridge in Washington Co., to Port Trading Corp., Albany, $26,970 est. $35,384. **P.W.A.** Bids Sept. 5.

New York—Triborough Bridge Authority, 111 8th Ave., New York, grading, draining facilities, etc., at Queens Connection of Triborough Bridge, connecting Manhattan, Queens and Bronx Boros, to P. T. Cox Contg. Co., 154 Nassau St., New York, $149,579. Bids Aug. 23. Noted Aug. 16.

New York—Triborough Bridge Authority, 111 8th Ave., New York, paving Whitlock Ave. and grading, paving Eastern Blvd., to J. Leopold & Co., 60 East 42nd St., New York, $237,023 and $113,797 respectively; Eastern Blvd., to C. D. Beckwith, Inc., Seneca Ave. and Edgewater Rd., New York, $156,705, all above work on Bronx Connection Triborough Bridge, connecting Manhattan, Bronx and Queens Boros. Grand total $507,525. Bids Aug. 30. Noted Aug. 23.

N. Y., Rochester—G. A. Fuller Co., general contractors, 597 Madison Ave., New York, 900 tons structural steel for Elmwood Avenue Bridge, to McClintic Marshall Co., Bethlehem, Pa. Noted Sept. 13, under "Contracts Awarded."

Ohio — O. W. Merrell, dir. Hys., Columbus, constructing concrete bridge with steel beams, on Sect. "B" Columbus-Wooster Rd., also brick paving, incl. furnishing, delivering brick 0.315 mi. approaches, to R. W. Rankin, 513 Samaritan Ave., Ashland, $36,824; constructing steel through truss bridge, and 0.097 mi. approaches, to Lackawanna Steel Constr. Corp., Cheektowaga, Buffalo, N. Y., $66,265. Bids Aug. 31.

Pennsylvania—At office S. S. Lewis, secy. Hys., Harrisburg, 650 ft. through plate girder bridge and bit. penetration on native stone paving R. 103, Westfield Twp., Tioga Co., to C. F. Goeringer, 296 Madison St., Wilkes-Barre, $24,079. Bids Aug. 31. Noted Aug. 23.

Pennsylvania—See "Streets and Roads."

†Wyoming—Pub. Rds., Denver, Colo., constructing bridge at south entrance highway to Yellowstone Natl. Park, to O. Nelson, Logan, Utah, $70,278. Bids Sept. 6.

†Wyoming—Pub. Rds., Denver, Colo., 5 timber bridges, concrete abutments and masonry walls, on Grand Loop Hy., Yellowstone Natl. Park, to McLaughlin Constr. Co., Livingston, Mont., $50,817. Bids Aug. 15.

British Columbia—Pacific Great Eastern Ry., 736 Granville St., Vancouver, C. L. Bates, engr. M.W., Squamish, constructing steel bridge at Mile 19 over Cheakamus Canyon, to Dominion Bridge Co. Ltd., 275 West 1st St., Vancouver, $45,000; 2 timber bridges at Mile 319 and 327, to W. C. Arnett & Co. Ltd., 985 East Hastings St., Vancouver, $50,000.

STREETS AND ROADS

BIDS ASKED

Arizona—Oct. 3, by State Hy. Comn., Phoenix, grading, concrete paving 2,830 sq.yd. Mesa-Casa Grande Hy. N.R.M. 97-E; aggregate base course and oil processing 13.7 mi. Holbrook-Lupton Rd. N.R.H. 83-E; and 6.2 mi. Ashfork-Kingman Hy. N.R.H. 80-J. T. S. O'Connell, state hy. engr.

†California—Pub. Rds., 461 Market St., San Francisco, rejected bids Aug. 9, grading road in Plumas Co. Will readvertise. Noted Aug. 2.

Delaware—Oct. 3, by State Hy. Dpt., Dover, clearing, grubbing, bridge excavation, machine grading 4.287 mi. Bayard-Ocean View Rd., Contr. 387, N.R.S. 131; 3.3 mi. Underwood's Corner-Blanco Rd., Contr. 354, N.R.S. 123; clearing, grubbing, grading 4.24 mi. Redden-Milton Rd., Contr. 353, N.R.S. 129; 2.548 mi. Ellendale-North 6 School Rd., Contr. 351, N.R.S. 128, foregoing in Sussex Co.; bridge excavation, machine grading 2.204 mi. Howells School-Kirkwood Rd., Contr. 363, N.R.S. 124x, New Castle Co.; grubbing, machine grading, 6.677 mi. Maryland line to Flemings Corner, Contr. 305, N.R.S. 133; 6.232 mi. Wrights Corner-Hazlettville Rd., Contr. 327, N.R.S. 122; machine grading 5.218 mi. Five Points-Woodland Rd., Contr. 357, N.R.S. 130; 2.215 mi. Lincoln City-Shawnee Rd., Contr. 359, N.R.S. 126, foregoing in Sussex Co.; clearing, grubbing, machine grading 2.74 mi. Smyrna-White House Rd., Contr. 364, N.R.S. 132, Kent Co.; 3.454 mi. Reynolds Corner-Armstrong's Corner Rd., Contr. 360, N.R.S. 125, New Castle Co.; grubbing, clearing 0.3 acres Saw Mill Bridge and roadway, Contr. 264-A, Sussex Co.; 9,240 lin.ft. creosoted timber piling, 140 M. ft. B.M. creosoted sheet piling, 30 M ft. B.M. creosoted timber for Wales or 8,520 lin.ft. creosoted timber piling, 15 M ft. B.M. creosoted timber for Wales, 460,000 lb. steel sheet piling, Contr. 389, Bethany Beach-Groins; 17,850 lin.ft. creosoted timber piling, 271 M. ft. B.M. creosoted sheet piling, 56 M ft. B.M. creosoted timber piling for Wales or 16,600 lin.ft. creosoted timber piling, 28M ft. B.M. creosoted timber for Wales, 900,000 lb. steel sheet piling, Rehoboth Beach-Groins, Contr. 388. W. W. Mack, Dover, engr.

Iowa—Sept. 25, by State Hy. Comn., Ames, concrete paving 10,362 sq.yd. NKM 27-CD, Primary Rd. 3, Centerville, Appanoose Co., incl. 40,382 cu.yd. excav.; 27,950 sq.yd. Secondary Rd. NRS-487-A, Black Hawk Co., 7,683 cu.yd. excav.; 42,235 sq.yd. U. S. Rd. 169, NRH 504-A, Kossuth Co., 37,400 cu.yd. excav.; 65,197 sq.yd. NRH-342-A, Primary Rd. 33, Plymouth Co., 11,889 cu.yd. excav.; 45,565 sq.yd. Mound St., Davenport, Scott Co., 32,623 cu.yd. excav.; grading 1.924 mi. Secondary Rd. southeast of Exira, NRS-478-B, Audubon Co., 42,856 cu.yd. excav.; 9.053 mi. Secondary Rd. west of LaPorte, NRS-436, Black Hawk Co., 102,405 cu.yd. excav.; 7.837 mi. Primary Rd. 32, F-490, Dickinson Co., 113,666 cu.yd. excav.; 2.894 mi. Primary Rd. 118, F-440, Hardin Co., 60,438 cu.yd. excav.; 6.602 mi. Primary Line Rd. 16, east toward Denmark, Lee Co., 138,976 cu.yd. excav.; 4.065 mi. Secondary Rd. from Sharpsburg east, NRS-486-B, Taylor Co., 96,010 cu.yd. excav.; gravel or crushed stone surfacing 11.77 mi. NRS-462-AB, Secondary Rd. north and south of Fontanelle, Adair Co.; 6.918 mi. Primary Rd. 148, F-348-B, Cass Co.; 5.6 mi. Primary Rd. 204, F-354, Decatur Co.; 11.486 mi. Primary Rd., F-51-C, Guthrie Co.; 4.871 mi. NRS 505, Iowa Co.; maintenance gravel resurfacing 70.8 mi. M-370, Lyon Co.; 5.4 mi. Osceola Co.; 6.1 mi. M-372, Plymouth Co.; 30.7 mi. M-373, Pocahontas Co.; 70 mi. M-374, Sioux Co.; 24 mi. M-375, Crawford Co.; 37 mi. M-376, Ida Co.; 75 mi. M3-377, Sac Co.; 18 mi. M-378, Cherokee Co.; 65.65 mi. M-379, Buena Vista Co.; 19 mi. M-389, Monona Co. P.W.A. project. F. R. White, ch. engr.

†Idaho—Sept. 28, by Pub. Rds., Ogden, Utah, constructing or improving 4.313 mi. Warm River-Yellowstone Rd., NR 34 A10, within or partly within Targee Natl. Forest, Fremont Co., incl. 65,100 cu.yd. unclassified and 1,520 cu.yd. structure unclassified excav. B. J. Finch, dist. engr.

Ia., Waverly—Sept. 24, by State Hy. Comn., Ames, grading County Trunk Hy., incl. 41,700 cu.yd. Class 2 earth and 200 cu.yd. class 1 rock excav.; also 4 concrete pipe and 3 rein.-on. box culverts. W. S. Chapman, co. engr.

Kansas—Sept. 25, by State Hy. Comn., at office of County Clerk, bituminous mat surfacing 7.844 mi. Project 50N-12-NRH 139-2 (1935) Pawnee Co.; 1.296 mi. Project 41-1-NRS 513-A (1935) Comanche Co.; earthwork and culverts 0.708 mi. Project 166-3-NRH 356-H (1935) Cowley Co.; 2.961 mi. Project 160-2-NRH 451-B1 (1935) Barber Co.

Kansas—Sept 28, by State Hy. Comn. at office of County Clerk, Ellsworth, concrete paving, roadside improvement 3 mi. Project 40S-14 N.R.H. 436 B (1935), Ellsworth Co.; earthwork and culverts, roadside improvement 5.552 mi. Project 15-15 N.R.H. 370 D (1935), Dickinson Co.

Maryland—Sept. 25, by State Roads Comn., Baltimore, grading, drainage for dual hy. 4.25 mi. along Phila. Rd. relocation from Belcamp to Aberdeen, Contr. H-187-48, Federal Aid Project N.R.H. 335 F, Harford Co.

Mass., Amesbury—Sept. 24, by Town, Bd. Selectmen, Town Hall, A. F. Rice, engr., 2,400 ft. 6 in. bituminous macadam surfacing, 24 ft. and up wide. To exceed $20,000. A. F. Rice, town engr.

Missouri—Sept. 28, by State Hy. Dpt., Jefferson City, improving roads in Buchanan, Caldwell, Clay, Clinton, Davies, Gentry, Nodaway, Adair, Chariton, Livingston, Schuyler, Audrain, Lincoln, Marion, Shelby, Benton, Lafayette, Platte, Montgomery, St. Francois, Washington, Jasper, Vernon, Christian, Webster, Howell, Oregon, Texas and Butler Counties. T. H. Cutler, ch. engr.

Nebraska—Sept. 27, by State Dpt. Roads & Irrigation, Lincoln, widening, paving, constructing bridge and viaduct on 5 mi. U. S. Hy. 30, east of Elkhorn, Douglas Co.; grading, paving 4 mi. Hy. 24, south of Elmwood, Cass Co.; grading, structures 4 mi. U. S. Hy. 6, Hitchcock and Red Willow Counties; graveling for bituminous mat surfacing 8 mi. Hy. 2, Otoe Co.; paving 5 bridges on 6.4 mi. Hy. 73, Burt and Washington Counties; 0.7 mi. U. S. Hy. 30, Paxton, Keith Co.; 0.7 mi. Hy. 20, in Ainsworth, Brown Co.; graveling 5.6 mi. Hy. 2, Otoe Co.; 2.2 mi. Hy. 6, Cambridge and Holbrook, Furnas Co.; 28 mi. Hy. 4, Thayer and Jefferson Counties; 6.3 mi. Nebraska Hy. 4 and U. S. Hy. 75, Richardson Co. $755,000.

New York—Oct. 2, by A. W. Brandt, comr. Hys., Albany, graveling 4.42 mi. road in Ontario Co.; 210 ft. bridge in Jefferson Co.; bituminous macadam repaving 3.79 mi. road in Herkimer Co.; 0.72 mi. and 120 ft. bridge in Greene Co.; 3.5 mi. Warren Co.; concrete and bituminous repaving 4.11 mi. Chemung Co.; concrete repaving 5.27 mi. Ontario Co.; 85 ft. girder concrete approach 0.43 mi. Orange Co.

North Carolina—Sept. 26, by State Hy. and P. Wks., Raleigh, W. V. Baise, acting engr., cement bound macadam paving 1.24 mi. County Project 446, Rowan Co., $17,000; grading, sand asphalt surfacing, structures 5.79 mi. Project 1023, Pamlico and Beaufort Counties, $57,000; bituminous surface treating 2.39 mi. Project 4782, Wake Co., $8,300; 5.78 mi. Project 4096 Durham Co., $21,000; 10.84 mi. Project 1515, Hyde Co., $34,800; improving 11.98 mi. Project 1516, New Holland Canal to Englehard, Hyde Co., $38,000; concrete or bituminous concrete paving 0.74 mi. Project 1823, Pitt Co., $27,000; artificial sand clay and crusher stone surfacing 6.93 mi. Project 6454, Lincoln Co., $31,000; sand asphalt paving 4.39 mi. Project 6671, Richmond Co., $57,000; grading, gravel surfacing, structures 5.71 mi. Project 8141, Caldwell and Burke Counties, $58,000; structures on 4.6 mi. Project 9560, Jackson Co., $12,000.

O., Zanesville—See "Contracts Awarded."

Pennsylvania—Sept. 28, at office S. S. Lewis, secy. Hys., Harrisburg, rein.-con. paving 5,399 ft. R-53, Sect. R-4, Juniata Twp., Blair Co., involving 816 cu.yd. Class 1 and 672 cu.yd. Class 2 excav.; 993 ft. R-55, Sect. R-7, Tyrone Borough, Blair Co., 1,389 cu.yd. Class 1, and 317 cu.yd. borrow excav.; dual type paving 10,957 ft. R-34, Sect. 1-B, Camp Hill Borough, Hampden Twp., Cumberland Co., 17,256 cu.yd. Class 1 and 411 cu.yd. Class 2 excav.; rein.-con. bridge R-109, Bridge 7, Washington Twp., Greene Co., 831 cu.yd. Class 1 and 828 cu.yd. Class 2 excav.; native stone or modified broken stone base with bituminous penetration surfacing 11,890 ft. R-33033 and 650 Spur, Winslow Twp., Jefferson Co., 15,715 cu.yd. Class 1 and 794 cu.yd. Class 2 excav.; 5,905 ft. R-349, Milford Twp., Juniata Co., 1,876 cu.yd. Class 1, 306 cu.yd. Class 2, and 7,865 cu.yd. borrow excav.; rein.-con. paving 9,711 ft. R-35009, Sect. 3, Spring Brook and Roaring Brook Twps., Lackawanna Co., 34,280 cu.yd. Class 1, 1,057 cu.yd. Class 2 and 495 cu.yd. borrow excav.; 10,001 ft. R-35009, Sect. 4, Roaring Brook Twp., Lackawanna Co., 38,317 cu.yd. Class 1, 399 cu.yd. Class 2, and 2,780 cu.yd. borrow excav.; 6,599 ft. R-33, Oliver Twp., Mifflin Co., 8,427 cu.yd. Class 1, 171 cu.yd. Class 2 and 611 cu.yd. borrow excav.; 10,875 ft. R-101, Sect. 10B, Liberty Twp., McKean Co., 1,000 cu.yd. Class 1 excav.; 7,050 ft. R-200, Sect. 2, Spring Creek Twp., Warren Co., 9,740 cu.yd. Class 1, 1,594 cu.yd. Class 2 and 295 cu.yd. borrow excav.; 6,143 ft. R-113, Sect. 13-A, North Bethlehem Twp., Washington Co., 19,312 cu.yd.

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†*Federal Government.*

Streets and Roads (Continued)

Class 1 and 293 cu.yd. Class 2 excav.; 7,301 ft. R-119, Sect. 8, Ligonier Twp., Westmoreland Co., 6,507 cu.yd. Class 1, 778 cu.yd. Class 2 and 5,475 cu.yd. borrow excav.; dual type paving 11,050 ft. R-126, Sect. 1, Jackson and West Manchester Twps., York Co., 13,556 cu.yd. Class 1, 760 cu.yd. Class 2 and 4,367 cu.yd. borrow excav.

South Carolina—Oct. 2 (extended date), by State Hy. Dpt., Columbia, clearing, grubbing, bituminous surfacing 4,707 mi. N.R.H. 125, Sect. 125, Sect. 4 (1935), McCormick Co., involving 2,400 cu.yd. unclassified excav., $40,000; 2,288 mi. N.R.H. 351, Sect. 2 (1935), Beaufort Co., 9,119 cu.yd. common excav., $30,000; 4,165 mi. N.R.S. 340-B (1935), Florence Co., 6,285 cu.yd. common excav., $45,000 •••2,023 mi. Route 6, N.R.S. 347-B (1935), Lexington Co., 3,735 cu.yd. common excav., $17,000; 3,422 mi. N.R.H. 345-B (1935), Lancaster Co., 23,127 cu.yd. unclassified excav., $40,000; clearing, grubbing, concrete widening 0.288 mi. N.R.M. 67-D, Sect. 2, Lee Co., 555 cu.yd. common excav., $12,000; plain concrete widening, grubbing, clearing, asphalt surfacing 0.443 mi. N.R.M. 28-D, Orangeburg Co., 663 cu.yd. common excav., $14,000; concrete paving 0.904 mi. N.R.M. 171-C, Sects. 1 and 2, and N.R.M. 313, Sect. 1, Marion Co., 5,801 cu.yd. common excav., $40,000; concrete widening 0.096 mi. N.R.M. 191, Kershaw Co., 239 cu.yd. excav., $5,000.

Utah—Sept. 27, by State Hy. Comn., Salt Lake City, reconstructing roadbed 2.436 mi. State Hy. between Halfway Hollow and Twists, Uintah Co., incl. 8,600 cu.yd. unclassified excav.; concrete surfacing 5,444 sq.yd. hy. on North Main St., Logan, Cache Co. P.W.A. project. K. C. Wright, state hy. engr.

†Utah—Sept. 28, by Pub. Rds., Ogden, constructing or improving 6.445 mi. Panguitch-Tropic Rd., within Powell Natl. Forest, Garfield Co., incl. 75,000 cu.yd. unclassified and 240 cu.yd. structure excav. B. J. Finch, dist. engr.

Vermont—Sept. 28, by State Hy. Dpt., H. E. Sargent, ch. engr., Montpelier, grading, drainage, gravel surfacing 1.8 mi. N.R.H. 81-G, Walden, Caledonia Co., involving 16,800 cu.yd. excav. and borrow, $26,000; 2.4 mi. Project N.R.H. 90-C, Derby, Orleans Co., 500 cu.yd. rock and 12,800 cu.yd. common excav., $25,000.

Virginia—Sept. 27, by State Hy. Dpt., Richmond, removing old concrete, disposing of material and furnishing concrete in place 400 cu.yd. in Fredericksburg Dist.; 337 cu.yd. in Culpeper Dist.; 911 cu.yd. in Richmond Dist.; and 211 cu.yd. in Suffolk Dist.

Wash., Seattle—Bd. P. Wks. soon takes bids widening and paving Seneca St. from 7th Ave. to Bway. $39,000. R. R. Beeman, County-City Bldg., engr.

Wisconsin—Sept. 25, by State Hy. and Burnette Dunn, St. Croix and Vernon Counties Hy. Comns., Madison, grading, draining, graveling 4.289 mi. Grantsburg-Siren Rd. (Mud Hen Lake-Siren) and St. Croix Falls-Superior (South County Line-Superior) Rds., S. T. Hys. 70 and 35, S.A.P. 8514 and 8484, Burnette Co., incl. 54,260 cu.yd. earth excav.; grading 5.234 mi. Durand-Menomonie Rd., State Trunk Hy. 25, S.A.P. 6215, 128,680 cu.yd. earth, borrow and channel excav.; crushed limestone surfacing 5.234 mi. Durand-Menomonie Rd., S. T. Hy. 25, S.A.P. 6215; structures on Durand Menomonie Rd., S. T. Hy. 25, S.A.P. 6215, all foregoing Dunn Co.; grading 1.973 mi. LaFarge-Hillsboro Rd. S. T. Hy. 82, S.A.P. 5477, 28,514 cu.yd. earth, borrow, marsh and channel excav.; 2.483 mi. Hillsboro-LaFarge Rd., S. T. Hy. 82, S.A.P. 5478; crushed stone surfacing 1.975 mi. LaFarge-Hillsboro Rd., S. T. Hy. 82, S.A.P. 5477; 2.483 mi. same road S.A.P. 5478; structures on same road S.A.P. 5477 and 5478, all foregoing Vernon Co.; constructing Weeks Bridge, S. T. Hy. 24, S.A.P. 6266, St. Croix Co.

Wisconsin—Sept. 28, by State Hy. and Douglas Co. Hy. Comns., Superior, grading 3.231 mi. Nowell Rd., County Trunk Hy. N, P.W.C. 988, Sect. 14, Douglas Co.; constructing Moose River Bridge, County Trunk Hy. M, P.W.C. 988, Sect. 31, incl. 290 cu.yd. excav. C. Hanson, hy. comr.

CONTRACTS AWARDED

California—C. H. Purcell, state hy. engr., State Bldg., Los Angeles, grading, oil treated crushed gravel or stone surfacing 6.8 mi. hy. between point 1½ mi. north of Moreno and point 2½ mi. west of Beaumont, Project "B," Riverside Co., to Mittry Bros. Constr. Co., 5531 Downey Rd., Los Angeles, $360,810. Bids Aug. 30, awarded Sept. 11. Noted Aug. 31 Daily.

California—State Hy. Comn., State Bldg., Los Angeles, grading, asphaltic concrete paving 3 mi. hy. in city of San Diego, San Diego Co., to G. R. Daley Co., 4430 Boundary St., San Diego, $24,416. Bids Aug. 23, awarded Sept. 11. Noted Aug. 27 Daily.

Colorado—State Hy. Dpt., Denver, paving and bridge project 0.228 mi. hy. between Colorado Springs and Manitou, State Project 871-1934, El Paso Co., to F. C. Dreher Constr. Co., 1634 Madison St., Denver, $43,747.

Colorado—State Hy. Dpt., Denver, gravel surfacing 4.034 mi. hy. between Riverbend and Limon on State Hy. 8 N.R.H. 140-J 2 (1935) changed to 111-B, Elbert and Lincoln Counties, to Blanchard Bros., 1641 South Logan St., Denver, $44,908; 2.995 mi. hy. southwest of Peyton on State Hy. 4, N.R.H. 79-D (1935), El Paso Co., to Owen & Horner, Box 1934, Denver, $75,237. **P.W.A.** Bids Sept. 6, awarded Sept. 10.

Illinois—Dpt. P. Wks. & Buildings, Div. Hys., Springfield, paving 0.36 mi. Dupage Co., to E. C. Otto, Inc., Downers Grove, $26,516••• 0.97 mi. Bureau Co., to E. M. Roche, Freeport, $37,852•••6.89 mi. Bureau Co., to Illinois Valley Constr. Co., Ottawa, $101,877•••5.36 mi. Henderson Co. and 5.12 mi. LaSalle Co., to Cameron Joyce Co., Keokuk, Ia., $105,152 and $103,750 respectively•••1.32 mi. Knox Co. and 0.35 mi. Piatt Co., to Joyce Bros. Constr. Co., Springfield, $48,585 and $11,057 respectively •••0.47 mi. Fulton Co., to Hartman Clark Bros. Co., Peoria, $19,152•••1.87 mi. Sangamon Co., to Hurden Constr. Co., Springfield, $60,520••• 0.24 mi. Montgomery Co., to Triangle Constr. Co., Kankakee, $10,199•••0.95 mi. Franklin Co., to Egyptian Constr. Co., Herrin, $38,980 •••0.19 mi. St. Clair Co. and 0.43 mi. road St. Clair Co., to J. Kesl & Sons Co., Edwardsville, $6,372 and $14,303 respectively•••0.3 mi. St. Clair Co., to M. Hoeffken & Co., Belleville, $18,617•••3.92 mi. McHenry Co., to C. F. Giertz & Son, Elgin, $125,070•••3.96 mi. Knox Co., to O'Conner Constr. Co., Springfield, $101,706•••11.51 mi. Crawford Co., to R. P. Devine, Watseka, $231,357•••7.49 mi. Franklin Co., to W. Lough & Sons, Marion, $167,441. Grand total $1,228,506. Bids Aug. 28. Noted Aug. 16.

Illinois—Dpt. P. Wks. & Buildings, Div. Hys., Springfield, paving 1.42 mi. Williamson Co., to Dungery & Cochran Constr. Co., Marion, $48,255•••6.14 mi. Fulton Co., to E. J. Eiff Co., Quincy, $67,659•••6.79 mi. Schuyer and Fulton Counties, to McCarthy Impvt. Co., $57,899 •••6.48 mi. Schuyler Co., to P. McGlone, City Bank Bldg., Kansas City, Mo., $89,777•••8.01 mi. Bond Co., to J. Mackler, Chicago Heights, $70,062•••2.17 mi. Edgar Co., to Breeden Constr. Co., Fulton, $17,956. Grand total $351,608. Bids Aug. 28, Noted Aug. 16.

Ill., Carlinville—Macoupin Co., concrete paving 2.0587 mi. Sect. 2-1-MFT, near Benld, to Moore & Kseidke, East St. Louis, $45,026. Bids Aug. 7.

Ill., Charleston—Coles Co., paving 2.2318 mi. Sect. 5X-1MFT, near Rardin, to Thornton & Sons, Mattoon, $38,982. Bids Aug. 20.

Ill., Chicago—Cook Co., paving 1.2652 mi. Sect. 033-0102 MFT, Lyons Twp., to H. G. Goelitz Co., Oak Park, $42,686. June 5.

Ill., Henry—City, curbing, rein.-con. paving 29,000 sq.yd. streets, to Trompeter Constr. Co., Peru, $64,739. **P.W.A.** Bids Aug. 22.

Ill., Quincy—City, concrete paving 0.1605 mi. Sect. 3-C-S and 0.3921 mi Sect. 5-C-S, to E. Eiff Co., Quincy, $12,978 and $12,938 respectively. Bids Aug. 7.

Iowa—State Hy. Comn., Ames, paving 0.708 mi. road in Black Hawk Co., to McKenzie Bros., Inc., Waterloo, $20,241•••0.253 mi. Bond Co., Haegg Constr. Co., Cedar Rapids, $8,493••• graveling 1.843 mi. Clarke and Decatur Counties, to Sargent Bros., Des Moines, $5,182••• 27.7 mi. Poweshiek Co., to L. J. Peters, Des Moines, $8,612•••grading 0.214 mi. road and 0.536 mi. road in Louisa Co., to G. H. Lowe, Cedar Rapids, $5,393 and $16,879 respectively •••1.96 mi. Pottawattamie Co., to Shirley Constr. Co., 306 South 24th St., Omaha, Neb., $46,846. Grand total $111,646. **P.W.A.** Bids Aug. 28. Noted Aug. 23.

Iowa—State Hy. Comn., Ames, to Dixon Co., Mystic, shale surfacing 17 mi. Appanoose Co. $3,563•••to Automatic Gravel Co., Muscatine, 15.7 mi. Henry Co. $3,109•••to Dane Co., Iowa City, 10.2 mi. Keokuk Co. $3,998; 14.6 mi. Johnson Co., $3,909•••to C. Pape and Art Hofer, Dubuque, stone surfacing 8.2 mi. Delaware Co. $4,059; 22 mi. Clayton Co. $6,351; 5.8 mi. Jackson Co. $1,891•••to Harvey Sand & Gravel Co., Harvey, graveling 4 mi. Lucas Co. $1,968•••to H. C. Young, Prairie City, 4.8 mi. Mahaska Co. $792•••to L. Plumb, Wapello, 8 mi. Washington Co. $1,520•••to Sargent Bros., Des Moines, 16.7 mi. Wayne Co. $5,092•••to Kelley Constr. Co., Des Moines, 9.1 mi. Jefferson Co. $2,302•••to B. L. Anderson, Toledo, 22 mi. Benton Co. $7,216•••to S. P. Moore, Cedar Rapids, 12.1 mi. Cedar Co. $5,445•••to Baker & Fatton, Cedar Rapids, and Cremer Constr. Co., Decorah, 19,663 mi. Delaware and Dubuque Counties, $19,765•••to E. A. Wickham & Co., Council Bluffs, 2.2 mi. Pottawattamie Co. $2,464. Grand total $73,444. Bids Sept. 12, awarded Sept. 12. Noted July 6.

Ia., Iowa City—City, curbing, guttering, removing 14,139 sq.yd. old paving and repaving with vitr. brick on mastic cushion 9 blocks Burlington St. (Route 6), to Horrabin Contg. Co., Iowa City, $56,838. **P.W.A.** Bids Sept. 7. Noted Aug. 30.

Kentucky—State Hy. Comn., Frankfort, grading, draining 1.481 mi. Elizabethtown-Leitchfield Rd., N.R.H. 147 D-G, Hardin Co., to Young & Lyons, Rogersville, Tenn., $21,671•••planting and minor construction for roadside beautification N.R.H. 163 B-P, 235 A-P, Marshall Co., and N.R.H. 232 B-P, Trigg, Lyon and Caldwell Counties, to Louisville Nurseries, Inc., St. Matthews, $2,101 and $664 respectively. Grand total $24,436. Bids Aug. 24, awarded Sept. 11. Noted Aug. 16.

Kentucky—State Hy. Dpt., Frankfort, surfacing 0.671 mi. street in Paris, N.R.M. 234-C-S, Bourbon Co., to Louis des Cognets & Co., Lexington, $34,612•••furnishing, delivering, etc., for roadside beautification on Carrollton-Bedford Rd., N.R.H. 197-B-P, Carroll Co., and on Warsaw-Florence Rd., N.R.H. 168 B-P, Gallatin Co to Louisville Nurseries, St. Matthews, $1 and $259 respectively•••Covington-Florence Rd N.R.H. 141 B-P, Kenton Co., to Dixie Vie Nurseries, Covington, $173•••Louisville-Covington Rd., N.R.H. 194 A-P, Oldham Co., to Smis & Riebel, Prospect, $178•••widening 0.451 mi N.R.M. 151 D-S, Harlan Co., to Shields Const Co., Hazard, $14,676. Grand total $50,03 Bids Sept. 7, awarded Sept. 11. Noted Aug. 3

Kentucky—State Hy. Comn., Frankfort, lig oil and asphalt cut back surface mix on wat bound macadam surfacing 0.348 mi. streets Taylorville, Reg. 18-45, Spencer Co., to C. Col man, Harrodsburg, $9,955•••light oil and a phalt cutback surface treating MP 4-A and M 50-C, Clark Co. and MP 5-E, Scott Co., to Ke tucky Road Oiling Co., Frankfort, $10,630••• MP 22-E and MP 96-A, Boyle Co., MP 47-C Fayette Co. and MP 23-B, Jessamine Co., Carey-Reed Co., Lexington, $7,385. Grand tot $27,970. Bids Aug. 17. Noted Aug. 9.

Maryland—State Roads Comn., Baltimor bituminous surfacing 37.55 mi. Contr. AA-19 72, Anne Arundel Co., involving 207,098 ga bituminous materials, to T. Edgie Russell Co Frederick, $30,873•••concrete paving 0.1 m Contr. Ce-76-2-23, P.W.A., Cecil Co., to Empi Constr. Co., 31 South Calvert St., Baltimor $4,163•••stabilized earth paving 1.11 mi. Cont Wo-154-1-12, P.W.A., to Phillips Brother Salisbury, $13,823•••0.88 mi. Contr. Wo-153-1 12, P.W.A., to Waller Paving Co., Inc., Salisbury, $14,859, all foregoing Worcester Co.••• concrete shoulders, bituminous surface cours on macadam paving, Spec. "C." 0.626 mi. Cont M-244-311, P.W.A., Montgomery Co., to McGuir & Rolfe, foot 30th St. N.W., Wash., D. C., $15,841. Grand total $79,559. Bids Sept. 4. **P.W.A**

Massachusetts—Commonwealth of Massachusetts, Dpt. P. Wks., F. E. Lyman, comr., 100 Nashua St., Boston, bituminous macadam paving 19,738 ft. hy. and 2 small bridges, N.R.A. Project R-51, P.W.A. Docket 5726, Braintree and Randolph, to State Constr. Co., 353 Washington St., Brighton (Boston), $160,538. **P.W.A.** Bids Sept. 4, awarded Sept. 12.

Mass., Boston—City, and P. Wks. Dpt., C. J. Carven, comr., City Hall Annex, sheet asphalt paving Adams St. from Gallivan Blvd. to Pierce Sq., Dorchester, to A. G. Tomasello Son, Inc., 250 Stuart St., $50,848. **P.W.A.** Bids Sept. 6, awarded Sept. 12.

Mass., Boston—Dpt. P. Wks., C. J. Carven, comr., City Hall, granite block and sheet asphalt paving Southampton St. from Andrews Sq. to Mass. Ave., to S. J. Tomasello, 15 Bay St., Dorchester, $56,520. Bids Sept. 4, awarded Sept. 13. **P.W.A.** Noted Aug. 30.

Mass., Medford—Metropolitan Dist. Comn., 20 Somerset St., bituminous macadam paving 1 mi. Mystic Valley Parkway from Mystic Ave. to Middlesex Fells, to M. McDonough Co., Broadway, Malden, $87,009. Bids Aug. 30.

Mass., Milton—Commonwealth of Massachusetts, Metropolitan Dist. Comn., D. B. Keniston, comr., 20 Somerset St., Boston, bituminous macadam paving ¾ mi. Unquity Rd. in Blue Hills Reservation, to E. T. Dwyer, 55 Elmwood Park, East Braintree, $25,399. Bids Aug. 30, awarded Sept. 8.

Minnesota—State Hy. Dpt., St. Paul, to Hallett Constr. Co., Crosby, paving 2.2 mi. State Project 2-8-27, N.R.M. 249C, and 2-8-35, N.R.H. 431A, $40,470; 5 mi. S.P. 212-12-33-B, NRH and M 386 G1-G2, $103,238•••to Anderson & Sons, 100 North 7th St., Minneapolis, 6 mi. S.P. 14-7-31-1-E, NRH and M, 109B, C, $128,222; 3.5 mi. S.P. 169-35-33-6, S.P. 169-35-34-1A and B, NRH and M, 455-C1, C2, $79,918; 3.1 mi. S.P. 169-35-34-1-C, NRH 455-C1, $64,928 •••to J. S. McLaughlin & Sons, Liberty Bldg., Des Moines, Ia., 3.2 mi. S.P. 16-9-22, NRH and M, 228A, $77,377•••to Woodrich Constr. Co., 404 National Bldg., Minneapolis, 3.9 mi. S.P. 60-16-27B, NRH and M 452B1, $83,661; 4.4 mi. S.P. 60-16-29-A, NRH and M 452 A1, A2, $95,316•••to Nelson, Mullen & Webster, 355 Gateway Bldg., Minneapolis, 4.3 mi. S.P. 73-30-22-D, NRH 117C, $109,654•••to Hanlon, Okes, East 1501 1st Natl. Bank Bldg., St. Paul, 3.7 mi. S.P. 89-3-41-B, NRH 347E, $94,743; 2.5 mi. S.P. 79-3-41-F, NRH 347F, $60,513 •••to S. J. Reader & Co., 2910 27th Ave., S. Minneapolis, 5 mi. S.P. 210-2-41-B, NRH and M 386-G1-G2, $99,866•••to P. C. Roth, 625 West Central Park Pl., St. Paul, bituminous treating 15.8 mi. S.P. 181-18-22, NRH 231 S.P. 18-18-24, NRH 51-A, $73,534•••to Gaus-Culligan Co., 1954 University Ave., St. Paul, 8.9 mi. S.P. 22-39-24-1, NRH and N 366-B1, B2, $23,268•••to Thornton Bros. Co., 1343 Dayton Ave., St. Paul, 15.6 mi. S.P. 28-28-22-2, NRH and M 127-A, B, C and D, $59,817•••to Erickson, Johnson & Fraser, 3131 22nd Ave. S., Minneapolis, grading 3.4 mi. S.P. 32-177-22-1, incl. 103,202 cu.yd. excav., $19,520•••to Griffis Bros., 5528 Nicollet Ave., Minneapolis, 1.9 mi. S.P. 44-44-21-1-A, NRH and M 147-B1, B2, $36,624•••to O. Schenkey, Middle River, graveling 18.1 mi. S.P. 11-11-31, NRH and M 413-B1, B2, $17,202. Grand total $1,267,871. **P.W.A.** Rejected bids Sept. 7, bituminous treating 23.7 mi. S.P. 6-22-1, 7-66-21-2-A and B, 7-66-24-3, NRH and M 437-B1, B2, S.P. 7-66-21-4, NRH 437-A, S.P. 7-66-21-5, NRH and M 437-C1, C2. Bids Sept. 7.

Mississippi—State Hy. Comn., Jackson, grading, structures, bridges, paving 4.072 mi. Verona-Tupelo Hy., Lee Co., to Froemming Bros., 4834 North Green Bay Ave., Milwaukee, Wis.

†*Federal Government.*

Streets and Roads (Continued)

$103,052; 7.73 mi. Tupelo-Corinth Hy., Lee Co., to F. S. Neely, West Point, $93,940. P.W.A. Bids Sept. 4.

Mississippi—State Hy. Comn., E. D. Kenna, dir., Jackson, grading, surfacing, drainage structures, bridging 4.966 mi. Philadelphia-Louisville Hy. in Winston Co., to Cobb Bros. Constr. Co., Citizens Bank Bldg., Meridian, $66,616 est. $50,000; grading, drainage structures, bridging 2.722 mi. Columbus-Aberdeen Hy., Lowndes Co., to F. S. Neely, West Point, $38,354 est. $26,000. P.W.A. Bids Sept. 11. Noted Aug. 30.

Nebraska—State Hy. Comn., Lincoln, to Abel Constr. Co., Lincoln, sand and gravel surfacing 2.1 mi. Box Butte and Sheridan Counties, $2,142; 4.4 mi. Morrill Co., $3,154; 9 mi. Lincoln-Emerald Rd., $25,984***to C. W. Christ, Sidney, 12.5 mi. Kimball Co., $3,684***to C. Krotter, Palisade, 10.1 mi. Chase Co., $4,334***to Weaver & Singer, Gibbon, 8.2 mi. Frontier and Dawes Counties, $3,367***to G. E. Smith, Lincoln, concrete box culvert, Lancaster Co., $1,578***to M. M. Lippencott, Hastings, graveling 8.2 mi. Greeley Center-Cedar Rapids Rd., $4,842; 12 mi. Lawrence West, $3,142***to H. Hawke, Gibbon, 9.6 mi. Lawrence West, $3,258***to E. W. Nichols, Fairmont, 17.8 mi. Ragan-Campbell Rd., $8,238***to Roberts Constr. Co., Lincoln, at Mason City North, $1,759***to Peter Kiewits Sons Co., 1024 Omaha Natl. Bank Bldg., Omaha, Nebr., paving 0.1 mi. road in Omaha, $17,993***to Duncan Gravel Co., Duncan, 7.8 mi. in Prague Co., $2,270. Grand total $85,745. Bids Sept. 7. Noted Aug. 30.

New Jersey—State Hy. Comn., Trenton, grading, rein.-con. paving 11,035 sq.yd. and concrete surfacing 572 sq.yd. road in Mercer Co., to P. DeAntonio, 224 East Hanover St., Trenton, $43,802. Bids Sept. 10. Noted Aug. 23.

New York—A. W. Brandt, comr. Hys., Albany, reconstructing 2.79 mi. Monroe Co., to Tomack Subsidiary, Inc., Rochester, $66,274 est. $80,669***3.56 mi. Hamilton Co., to Green Island Constr. Co., Green Island, $132,374 est. $161,800***0.17 mi. Fulton Co., to Utica Constr. Co., Utica, $87,379 est. $103,206***7.24 mi. Oneida and Lewis Counties, to Law Bros. Contg. Corp., Herkimer, $308,089 est. $379,625***4.3 mi. Rensselaer Co., to L. Longhi & Son, Torrington, Conn., $153,334 est. $194,353***4.03 mi. Onondaga Co., to J. Bellardino, Seneca Falls, $133,792 est. $152,514***3.88 mi. Jefferson Co., to Whitmore, Rauber & Vicinus, Hebard St., Rochester, $139,304 est. $170,399. Grand total $1,020,546. P.W.A. Bids Aug. 24 and Sept. 5. Noted Aug. 16 and 23.

N. Y., Brooklyn—R. V. Ingersoll, pres. Brooklyn Boro, Boro Hall, to B. Turecamo Contg. Co., 1573 63rd St., Brooklyn, asphalt paving Brighton 5th St., $29,109; Herkimer St., $30,529***to Meehan Paving & Constr. Co., 90 West St., New York, Flatbush Ave., $4,002***to G. Alfieri, 188 Ainslie St., regulating East 23rd St., $2,072; Wyona Ave., $1,103; 24th Ave., $1,762***to Brooklyn Alcatraz Asphalt Co., 407 Hamilton Ave., asphalt paving India St., $21,764***to Borough Constr. Co., 139-32 231st St., Laurelton, regulating East 40th St., $2,638. Grand total $92,979. Bids Aug. 29. Noted Aug. 23.

N. Y., Long Island City—G. U. Harvey, pres. Queens Boro, Queens Subway Bldg., to Meehan Paving Co., Laurel Hill Blvd., asphalt paving Freshpond Rd., $18,092; Metropolitan Ave., $53,825; 168th St., $32,654; 57th St., $79,368***to W. P. McDonald Constr. Co., 7 Lawrence St., Flushing, 47th St., $4,319***to Sprague Constr. Co., Alameda Ave., Rockaway Beach, Rockaway Beach Blvd., $25,995; Mott Ave., $12,731***to Carbloc Paving Co., Varick Ave. and Stagg Sts., Brooklyn, Myrtle Ave., $22,449; Roosevelt Ave., $22,446; 70th Ave., $22,974***to Pomonok Asphalt Paving & Building Material Co., 1217 Grand Ave., Brooklyn, Gleans St., $8,005; Linden St., $8,998; 33rd St., $8,086; 46th St., $4,382***to P. K. Kelley Contg. Co., 6009 Woodside Ave., Woodside, asphalt block paving 54th St., $13,323***to Boro Constr. Co., 139-32 231st St., Laurelton, regulating 53rd Ave., $2,943. Grand total $340,590. Noted Aug. 16.

N. Y., New York—S. Levy, pres. Manhattan Boro, Municipal Bldg., to C. D. Beckwith, Inc., Seneca Ave. and Edgewater Rd., asphalt paving East 99th St., $6,115; West 144th St., $10,473; West 130th St., $10,208***to Highway Impvt. & Repair Co., Furmans Island, Brooklyn, Broome St., $4,549; West 40th St., $11,139. Grand total $42,484. Bids Aug. 13. Rejected bids asphalt paving West 50th St. Noted Aug. 9.

N. Y., New York—S. Levy, pres. Manhattan Boro, Municipal Bldg., asphalt block paving West 68th St. and East 92nd Sts., to St. George Paving Co., 415 Lexington Ave., $11,174 and $12,748 respectively***asphalt paving East 84th St., to Venetian Contg. Co., 2 Lafayette St., $18,325. Grand total $42,247. Bids Aug. 15. Noted Aug. 9.

N. Y., New York—S. Levy, pres. Manhattan Boro, Municipal Bldg., asphalt block paving West 141st St., to E. T. Barry, 126-06 139th Ave., Laurelton, $6,973; regrading, recurbing, laying sidewalks on 13th Ave., to Meehan Paving & Contr. Co., 90 West St., $182,050. Bids Aug. 9.

N. Y., New York—J. J. Lyons, pres. Bronx Boro, County Bldg., 161st St. and Grand Concourse, to Venetian Contg. Co., 2 Lafayette St., asphalt paving Trinity Ave. $16,050; East 156th St. $9,424; asphalt block paving East 158th St. $12,055***to C. B. Beckwith, Inc. Seneca Ave. and Edgewater Rd., Prospect Ave $88,433***to Bronx Asphalt Corp., 900 Zerega Ave., asphalt paving Soundview Ave., $177,576***to Melrose Excavators Co., 294 East 156th St., New York, regulating Delancey Pl. $28,361. Grand total $331,899. Bids Aug. 23. Noted Aug. 16.

N. Y., Riverhead—Suffolk Co., concrete paving 1.81 mi. Straight Path, connecting Long Island Ave. and Farmingdale Rd., 20 ft., to R. Jannotta, Roslyn, $56,211. Bids Sept. 10.

N. Y., Varysburg—Wyoming Co., graveling East Koy-Pike Hy., day labor under supervision F. Ramsey, co. supt. of hys. $32,000.

N. C., Lenoir—W. J. Lenoir, mayor and Bd. City Comrs., street improvements, to Ames & Webb, Inc., Box 1239, Raleigh, $37,946 P.W.A. Bids Aug. 22. Noted Aug. 16.

Ohio — O. W. Merrell, dir. Hys., Columbus, brick paving, incl. furnishing and delivering brick 0.813 mi. Lima-Sandusky Rd., Allen Co., to Lewis & Copeland Co., 1019 Lima Trust Bldg., Lima, $51,466***bituminous macadam surface penetration paving 2.512 mi. Hamilton-Cleves Rd., Hamilton Co., to De Salvo Constr. Co., 2276 Spring Grove Ave., Cincinnati, $88,790***cold mixed asphaltic concrete paving 0.445 mi. Baltimore-Fostoria Rd., Wood Co., to C. H. Gray, Waterville, $19,500. Grand total $159,756. Bids Aug. 31.

O., Zanesville—City, removing trolley car rails and repaving various streets, day labor, under supervision of City Engineering Dpt. Est. $30,951. FERA project funds allotted.

Pennsylvania—At office S. S. Lewis, secy. Hys., Harrisburg, bituminous surface Spec. "E" on plain concrete paving 0.27 mi. Roaring Springs Borough, Route 384, Sect. R-2, Blair Co., to E. R. Vipond, Hollidaysburg, $15,938***45 ft. rein.-con. bridge, Route 109, Bridge 16, Morris Twp., Greene Co., to R. E. Furner, Waynesburg, $5,955***1,150 ft. through truss bridge, grading, draining Route 291, Sect. 4, Hillsgrove Twp., Sullivan Co., to Reed & Kuhn, Ellysburg, $41,424. Grand total $63,357. Bids Aug. 31. Noted Aug. 23, under "Bridges and Grade Crossings."

Pennsylvania—At office S. S. Lewis, secy. Hys., Harrisburg, widening existing pavement with rein.-con. 2.38 mi. hy. also 4 rein.-con. structures Route 281, Sect. 3, Morrisville Boro, Fall Twp., Bucks Co., to Benjamin Foster Co. Inc., 20th St. and Erie Ave., Phila., $25,048***497 ft. double span I-beam stringer bridge and bit. spec. "E" on native stone paving Route 50, Bridge 12, Confluence Boro, Somerset Co., to Holt, McConnell & Osburn, Inc., 30 Murdock St., Cannonsburg, $18,410***rein.-con. paving 0.7 mi. hy. and 2 rein.-con. bridges Route 336, Zerbe Twp., Northumberland Co., to Joseph Latorre & Co., 229 Taylor St., Atlas, $63,020***0.37 mi. rein.-con. pavement 20 ft. wide with relaid brick, Route 222, Weimber and Paint Boros, Scalp Level Boro, Somerset and Cambria Counties, to E. H. and L. A. Brua, Jr., Hollidaysburg, $21,999. Grand total $228,477. Bids Aug. 17. Noted Aug. 9.

Pennsylvania—At office S. S. Lewis, secy. Hys., Harrisburg, widening concrete pavement 6 ft. on each side also rein.-con. pavement, 42 ft. wide and bit. spec. "E" on broken stone paving, grading, drainage 1.96 mi. Route 246, Sects. 6-A and 7, Ross and McCandless Twps., Allegheny Co., to McCrady Constr. Co., 239 4th St., Pittsburgh, $194,043. Bids Aug. 14. Noted Aug. 2.

Pa., Phila.—Repaving Malvern Ave. Dist., Schedule A-1, to Barber Asphalt Co., 1600 Arch St.***Van Pelt St. Dist., Schedule A-2, to Union Paving Co., Broad and Stiles Sts.***20th St. Dist., Schedule A-3, to Eastern Asphalt Co., Penna Bldg.***2nd St., Schedule B-1, to State Paving & Constr. Co., 836 North Holly St.***10th St., Schedule B-2 and country roads, Schedule C, to Atlas Paving Co., 317 South 6th St. Est. $92,750.

Tennessee—Dpt. Hys. & P. Wks., Nashville, surfacing and constructing 1 concrete culvert on 1.962 mi. State Hy. 52, State Aid Project 410-A, Sumner Co., to Interstate Constr. Co., Independent Life Bldg., Nashville, $8,124***constructing bridge, approaches over Obey River, State Hy. 3, N.R.S. 403-A, Clay Co., to Bell & Bell, 1401 Dickerson Rd., Nashville, $70,848***bridge and approaches on Hy. 52, at Hermitage Springs, Clay Co., to Garrett Bros., Knoxville, $13,854. Grand total $92,826. P.W.A. Rejected bids roadside development, etc., $13,127 mi. Project NRH 248 E and C. Know, Blount and Sevier Counties; applying double flush asphalt seal coat on 1.915 mi. State Hy. 6, State Aid Project 206, Davidson Co. Bids Sept. 7. Noted Aug. 23.

Utah—State Rd. Comn., Salt Lake City, concrete surfacing 1.87 mi. road Salt Lake Co., to Gibbons & Reed, 164 East 4th St. S., Salt Lake City, $77,077 est. $101,658***0.894 mi. road Salt Lake Co., to Christensen & Gardner, Interurban Depot Bldg., Salt Lake City, $26,874 est. $33,418. P.W.A. Bids Sept. 10.

Wash., Walla Walla—Comrs. Walla Walla Co., grading, oiling, crushed rock surfacing 11,757 cu.yd. Secondary Hy. 3, Touchet Rd. North, incl. 137,590 cu.yd. earth and 10,215 cu.yd. solid rock excav., to Columbia Power & Investment Co., Stevenson, $80,000. Noted July 5.

†Wyoming—Pub. Rds., Denver, Colo., oil processing roadbed 35.95 mi. Hoback Canyon Natl. Forest Rd., Teton and Wyoming Natl. Forest, Teton and Sublette Counties, to Hoops Constr. Co., Twin Falls, Idaho, $53,365.

EARTHWORK, IRRIGATION DRAINAGE AND WATERWAYS

PROPOSED WORK

N. J., Long Branch—City Comn. plans jetties along beach front with state aid, $108,000 O. W. Morris, 184 Bway., engr. Noted Apr. 20, 1933.

O., Lakewood — City plans application for funds for breakwater extension at Lake Erie, paving, widening, resurfacing streets, wading pools, concrete grandstands, garage, and storage building and band stand comfort station. Est. about $200,000. P.W.A. project. E. A. Fisher, city engr.

BIDS ASKED

†Arkansas and Louisiana—Oct. 2, by U. S. Eng., Box 667, Vicksburg, Miss., constructing 432,000 cu.yd. earthwork on west bank Mississippi River in Arkansas and Louisiana.

Calif., San Francisco—Oct. 4, by P. Utilities Comn., City Hall, constructing levee for extension of landing field at San Francisco Airport, Airport Contr. 31, involving construction 140,000 cu.yd. levee, 10 M.F.B.M. spillway. Noted July 5, under "Unclassified."

†Ill., Utica—Sept. 27, by U. S. Eng., P. O. Bldg., Chicago, dredging 413,160 cu.yd. in Illinois River between Mile 113.2 and Mile 229.3.

Mich., Detroit—See "Waterworks."

†Mississippi—Oct. 2, by U. S. Eng., P. O. Box 667, Vicksburg, constructing 671,000 cu.yd. earthwork, Brunswick extension enlargement, Warren Co.; 782,800 cu.yd. Halpino Ldg. to Old River New Levee; 1,392,000 cu.yd. below Rosedale Enlargement, all on east bank of Mississippi River.

†N. Y., New York—Sept. 27, by U. S. Eng., Whitehall St., New York, removing 6,430 cu.yd. ledge rock and 12,750 cu.yd. other material from East River.

†Tex., Houston — Oct. 10, by U. S. Eng., Galveston, dredging 4,646,500 cu.yd. ship channel from Baytown to Houston Turning Basin. Noted Sept. 13.

†W. Va., Grafton—Oct. 16, by U. S. Eng., Pittsburgh, Pa., constructing Tygart River Dam, concrete, 1,850 ft. long, 237 ft high with outlet works, incl. 358,500 cu.yd. excav., 1,113,735 cu.yd. concrete, 236,000 lin.ft. grout and core holes, 1,890,000 lin.ft. reinforcing. Est. $8,000,000. Noted Aug. 23.

†W. Va., Huntington—Oct. 8, by U. S. Eng., 59,000 cu.yd. from Ohio River below U. S. Lock 16.

N. B., Mallock's Beach—Sept. 28, by Secretary Dpt. P. Wks., Ottawa, Ont., constructing breakwater, square timber cribwork block, 300 ft. long x 15 ft. wide for 270 ft. and 50 ft. wide for 30 ft., cribwork fully ballasted, 145,000 cu.ft. square timber, 3,000 ft. b.m. piles, timber 300 lin.ft. $27,500. K. M. Cameron, Ottawa, Ont., engr.

Ont., Collingwood—Sept. 26, by Secretary Dpt. P. Wks., Ottawa, Ont., C.N.R. dock reconstruction and removal of existing old timber cribwork and stone filling, involving 750 cu.yd. rein.-con. for superstructure and 350 cu.yd. blocks, 28,000 ft. B.M. timber stringers, 17,000 lb. reinforcing bars, 850 cu.yd. stone fill, sand and gravel surfacing, 7,280 ft. B.M. timber railing, 3,500 cu.yd. earth fill. $26,000. K. M. Cameron, Ottawa, engr.

CONTRACTS AWARDED

Calif., Richmond—Santa Fe Land & Impvt. Co., placing 20,000 tons rip rap on west side of Santa Fe channel in Richmond Harbor, rock to be taken from Yerba Buena Island, to Daniels Contg. Co., 503 Market St., San Francisco, $22,500. Awarded Sept. 5.

†Conn., Norwalk—U. S. Eng., Providence, R. I., dredging 135,000 cu.yd. Norwalk River, to G. W. Sunderland, Inc., 1 Seaview Ave., Bridgeport. Est. $43,000. Noted Aug. 23.

Md., Gibson Island—Bd. Comrs. Anne Arundel Co., Annapolis, constructing 2,300 ft. timber bulkhead with bituminous surfaced causeway, wood piling, sheeting and jetties, to Geo. T. Johnson & Sons, Cambridge, $32,225. Bids Sept. 4.

Mass., Malden—Commonwealth of Massachusetts, Dpt. P. Wks., F. E. Lyman, comr., 100 Nashua St., Boston, dredging 61,500 cu.yd. Mystic River above and below Malden Bridge, to J. S. Packard Dredging Co., 10 State St., Boston, $21,238. Bids Sept. 4.

†Missouri—U. S. Eng., Rock Island, Ill., repairing rock and brush wing and closing dams and bank protections in Mississippi River between Wisconsin River and Clarksville. Item 1, from C. C. Putnam, Bellevue, Ia., $17,404; Item 2, to M. E. Idle, Clarksville, $46,782. Noted Aug. 30.

†Missouri, Illinois, Kentucky and Arkansas—U. S. Eng., P. O. Box 97, Memphis, Tenn., 1,660,000 cu.yd. levee work in Lower St. Francis Levee Dist., to Brooks Calloway Co., Healey Bldg., Atlanta, Ga., $257,450***levee work in Reelfoot and Little River Drainage Dist., to Forcum James Co., Dyersburg, Tenn., $109,625***levee work in Lower St. Francis Levee Dist., to Driver Co., Memphis, Tenn., $108,330***

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†*Federal Government.*

Earthwork, etc. (Continued)

levee work, in Cairo Drainage Levee Dist., to E. E. Morgan Co., Jackson, Miss., $149,760. Grand total $625,165. Bids Aug. 28. Noted Aug. 16.

†New Jersey—U. S. Eng., 1109 Gimbel Bldg., Phila., Pa., dredging 1,593,000 cu.yd. from Delaware River between Burlington and Florence to Atlantic, Gulf & Pacific Co., 15 Park Row, New York, at 4.79c. per cu.yd. for as much work as can be done with available funds $600,000; 7,200 cu.yd. opposite Delanco, to P. Sanford Ross, 277 Washington St., Jersey City, $172,050. Bids Aug. 20. Noted Aug. 9.

†New York—U. S. Eng., 1st Dist., Whitehall St., New York, dredging 144,960 cu.yd. from East Rockaway Inlet, to W. H. Gahagan, Inc., 147 Remsen St., Brooklyn, $58,999. Bids Aug. 8. Noted Aug. 2.

†Oregon — Bureau Reclamation, Vale, constructing earthwork, structures on Vale Main Canal, Sta. 2450+00 to Sta. 3891+70, Vale Project, to Hass, Doughty & Jones, and Marshall & Stacy, Mercantile Exch. Bldg., San Francisco, Calif., $65,204. Bids Aug. 16. Noted Aug 2.

Rhode Island—State Emergency P. Wks. Comm., State House, Providence, constructing stone jetty, bulkhead, 2 piers, diversion wall, 2 pumped dikes and dredging channel and basin at Point Judith Pond, to Tucker Constr. Co., 348 Washington St., Providence, $220,994. **P.W.A.** Bids Aug. 29, awarded Sept. 10. Noted Aug. 24.

†Utah—Bureau Reclamation, Denver, Colo., three 16x12 ft. radial gates, 3 motor driven double-drum, radial gate hoists, four 2 ft. 9 in. by 2 ft. 9 in. high pressure gates, together with hydraulic hoists, gate hangers, automatic air valves and conduit linings, and 2 plate steel outlet pipes for installation in spillway and outlet works for Hyrum Dam, Hyrum Project, Item 1, to Pacific Car & Fdry. Co., White Bldg., Seattle, Wash., $1,725. Items 2 and 3, to Long Beach Iron Wks., $11,440***Item 4, to J. W. Beem, Guardian Trust Bldg., Denver, Colo., $4,829. Grand total $17,994. Bids Aug. 27. Noted Aug. 16.

Que., Riviere Ouelle—Secretary Dpt. P. Wks., Ottawa, Ont., wharf reconstruction, to L. Levesque, Riviere Ouelle, for Dpt. P. Wks., $29,957. Est. $40,000. K. M. Cameron, Ottawa, Ont., engr. Bids July 31. Noted July 26.

UNCLASSIFIED

PROPOSED WORK

California—ELECTRIC RAILWAY—California (State) Toll Bridge Authority, 500 Sansome St., San Francisco, surveys completed for electric railway on San Francisco-Oakland Bay Bridge over San Francisco Bay, in San Francisco and Alameda Counties, involving San Francisco terminal and viaduct approach, car storage yard on Key System in Alameda Co.; grade separation structures in Alameda Co.; tracks on main bridge structure; tracks on viaduct and at San Francisco Terminal; overhead electric system; electric block signal system; alterations on existing rolling stock, est. cost at San Francisco Terminal $5,905,000; est. cost at Alameda Co. terminal $8,700,000. Construction will be financed by R.F.C. loan. All contracts are to be let by California Toll Bridge Authority, 500 Sansome St., San Francisco. C. H. Purcell, P. Wks. Bldg., Sacramento, engr. Total est. $15,000,000.

N. Y., New York—STABLE, etc.—Seven Hundred Forty Water Street Corp., G. Baxt, pres., 275 Cherry St., plans by Scacchetti & Siegel, 1860 Bway., altering 3 story, basement, stable and storage, incl. new boiler, elevator and gasoline storage, 740 Water St. $28,000 with equipment.

N. Y., New York—SWIMMING POOL—Dpt. Parks, Arsenal Bldg., Central Park, plans by A. Embury, c/o owners, swimming pool, Van Cortland Park. $40,000.

N. Y., Rockville Center—FIRE ALARM SYSTEM—Municipality will not construct fire alarm system. $65,000. Project abandoned, defeated in municipal election. Noted Aug. 16.

O., Lakewood—WADING POOLS, etc.—See "Earthwork, Irrigation, Drainage and Waterways."

Okla., Oklahoma City—GAS SYSTEM—City, bond election postponed from Oct. 2 to Jan. 16, on account of intense opposition to the issue for constructing natural gas system. $4,000,000. Noted Aug. 16.

BIDS ASKED

Calif., San Francisco—AIRPORT IMPROVEMENTS—See "Earthwork, Irrigation, Drainage, Waterways."

Ind., Indianapolis—SWIMMING POOL—Oct. 1, by Riley Hospital, rein.-con. therapeutic swimming pool for children, at James Whitcomb Riley Hospital, 702 Wilson St. $40,000. R. F. Daggett, 922 Continental Bldg., engr. Noted Aug. 23.

N. Y., Jamaica—STABLES—See "Contracts Awarded."

N. Y., New York—ESCALATOR EQUIPMENT—Oct. 2, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., furnishing, installing passenger escalator equipment at East Bway. Station of Independent City-owned Rapid Transit R.R.

Tex., Beaumont—RACE TRACK—Gates Park, Inc., c/o O. E. Hause, Beaumont, taking bids (competitive) race track and appurtenances incl. 6,400 seating capacity grandstand, 18 stalls, 1 mi. track, paddocks, etc. $400 000. Noted Aug. 30.

CONTRACTS AWARDED

California—PIPE LINE—Standard Oil Co. of California, 225 Bush St., San Francisco, constructing 75 mi. pipe line from Rio Bravo, Kern Co. to Estero Bay, San Luis Obispo Co., comprising of East Division of 108 mi. 12 in. welded steel line, to Youdall Constr. Co., Matson Bldg., San Francisco, H. F. Brown, 223 Main St., San Francisco, and Stroud Bros. & Seabrook, Bakersfield; constructing 36 mi. pipe line from Rio Bravo to Estero Bay, former point in Kern Co. and latter in San Luis Obispo Co., comprising West unit of 108 mi. welded steel pipe line, to Lindgren & Swinerton, 225 Bush St., San Francisco. H. H. Hall, 225 Bush St., San Francisco, engr. Noted Aug. 30.

Calif., Los Angeles—TERMINAL RAILWAY—Harbor Dpt., C. B. Wirsching, mgr., Branch City Hall, San Pedro, constructing new terminal railway, to Pan-Pacific Piling & Constr. Co., 2145 East 25th St., $75,500. Est. exceeds $200,000. Subject to P.W.A. approval. **P.W.A.** Bids Aug. 29, awarded Sept. 12. Noted Aug. 16.

†Calif., San Diego—DOLPHINS, FLOATS, etc.—Yards & Docks, Navy Dpt., Wash., D. C., installing 19 pile fender dolphins, two 14x40 ft. floats, appurtenances for floating dry dock at Destroyer Base, to M. H. Golden, Calif. Bank Bldg., $22,040.

†Md., Aberdeen—LIGHTING SYSTEM—Con. Q.M., U. S. Proving Ground, night light installation, to Greenwood Electric Co., 90 East Stewart Ave., Lansdowne, Pa., $7,172. Bids Sept. 4. Noted Aug. 30.

†Md., Annapolis—RADIO TOWERS—Yards & Docks, Navy Dpt., Wash., D. C., altering radio towers, Spec. 7733, to E. B. Fouke, 2009 1st St. S.W., Wash., D. C., $21,444. Noted Aug. 30.

Md., Curtis Bay—CONCRETE FOOTINGS for STEAM LINE, etc.—See "Industrial Buildings."

Mich., Detroit—BASEBALL STADIUM—Detroit Baseball Co., Navin Field, Trumbull and Michigan Aves., constructing 17,000 seating capacity, 700 box seats, baseball stadium addition and temporary structure, steel and frame construction, to J. A. Utley, 729 Penobscot Bldg., approximately $25,000.

N. Y., Jamaica—STABLES—J. Miehl, 30-28 89th St., Jamaica, stables, separate contracts. $28,000. A. Mielenhausen, c/o owner, archt. Noted Sept. 6.

N. Y., Syracuse—COAL POCKETS—M. J. Vincett Sons., 115 East Genesee St., constructing overhead coal pockets to be constructed of rein.-con. blocks, Erie Blvd., to Nicholson Co., 405 Lexington Ave., New York. Est. approximately $30,000. Awarded about Sept. 1. Noted June 28.

N. C., Lenoir—FIRE ALARM SYSTEM—City, M. M. Williams, engr., fire alarm system, to Radio Service Co., Lenoir, $25,000. **P.W.A.** Bids Aug. 22. Noted Aug. 16.

Que., Malbaie—WHARF, etc.—Secretary Dpt. P. Wks., Ottawa, Ont., wharf and approach, incl. 6,010 cu.yd. cribwork, 2,850 ft. round timber, 2,480 ft. ballast floor, 1,100 cu.yd. stone and gravel fill, 6,200 ft. 4 in. B.M. sheathing, to D. Damours, Riviere du Coup Centre, $25,335. Est. $12,000.

MATERIALS AND EQUIPMENT

PROPOSED WORK

CABLE—**Los Angeles, Calif.**—D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Bway., rejected bids Aug. 8, lead covered paper insulated cable, Spec. 1455.

PUMPS, etc.—**Oakland, Calif.**—J. H. Kimball, secy. East Bay Municipal Utility Dist., 512 16th St., rejected bids two centrifugal pumps with electric motors, 1,400 g.p.m. head at 80 ft.

PORTABLE ROCK CRUSHER—**Oroville, Calif.**—F. Boyle, purch. agt., Butte Co., plans purchasing portable rock crusher for use of County Road Dpt.

STEAM SEPARATORS—**Chicago, Ill.**—Dpt. P. Wks., City Hall, rejected bids July 3, 4 steam separators with top flanges and straps for Lakeview Pumping Station. Noted Jan. 28.

DIESEL ENGINE—**Estherville, Ia.**—City soon takes bids new Diesel 750 hp. unit to replace an absolete unit to be traded in on new engine.

†IRON SHOULDER BUSHINGS, etc.—**Vicksburg, Miss.**—U. S. Eng., P. O. Box 667, rejected bids Sept. 5, 475 standard black malleable iron shoulder bushings and 250 iron caps. Will readvertise. Noted Aug. 30.

FREIGHT CONVEYOR—**Kansas City, Mo.**—City soon takes bids freight conveyor at State Line Wharf. Former bids rejected. R. Waddell, city engr.

STONE, etc.—**Trenton, N. J.**—State Purchas-Agent, rejected bids Aug. 1, 38,200 tons stone and 22,045 tons slag. Will readvertise. Noted July 26.

TANKS—**Jamestown, N. Y.**—Superior Oil Wks., Warren, Pa., plans installing three 15,000-20,000 gal. steel storage tanks at distribution station in Fluvanna Ave. to replace equipment recently destroyed by fire.

†TURBINES—**Oregon**—U. S. Eng., Custom House, Portland, rejected bids July 18, design and manufacture of two 60,000 hp. turbines and governing equipment for same.

BIDS ASKED

LIME ROCK—**Florida**—Sept. 27, at office State Road Dpt., Tallahassee, 2,200 tons lime rock for base construction f.o.b. O'Neil Siding for Project 886, Rd. 13, Nassau Co. J. H. Dowling, state hy. engr.

PIPE, etc.—**Jamestown, N. Y.**—V. A. Billstone, Lock Box, taking bids 3,000-4,000 lin. ft. 6¾- to 10-in. wrought iron pipe, connections, etc., for use in natural gas development program near Westfield. To exceed $1,000.

PAVING BRICK—**Braddock, Pa.**—Oct. 1 by G. B. McDonald, boro secy., Municipal Bldg., 43,000 brick 3x4x8½. in.

†RABBET ANGLES, etc.—**Huntington, W. Va.**—Sept. 28, by U. S. Eng., rabbet angles, corner protections, corner cap castings, etc. for U. S. Lock 14, Ohio River.

CONTRACTS AWARDED

CEMENT—**Los Angeles, Calif.**—Bd. Flood Control Dist., 205 South Bway., E. S. Eaton engr., 2,025 bbl. cement, cloth sacks, f.o.b. cars Pacific Electric siding, Brand Blvd., Glendale or f.o.b. truck site of work, to Southwestern Portland Cement Co., 727 West 7th St., $4,961; 176,400 lb. reinforcing steel, to J. W. Black 11,335 Court St., Lynwood, $5,155. Bids July 23, awarded Sept. 4. Noted July 19.

ALUMINUM SULPHATE—**Oakland, Calif.**—J. H. Kimball, secy. East Bay Municipal Utility Dist., 512 16th St., 1,000 tons aluminum sulphate Proposal 554, to Sulphur Chemical Co., 624 California St., San Francisco, at $28.19 per ton, total $28,190. Bids Aug. 22, awarded Sept. 6.

FIRE HYDRANTS, etc.—**San Francisco, Calif.**—T. A. Brooks, city purch. agt., City Hall, high pressure fire hydrants and nozzle caps, to M. Greenberg & Sons, 765 Folsom St., $162.80 and 98c. each respectively. Bids Aug. 6.

TANK, etc.—**New Haven, Conn.**—Walter H. Goodrich & Co., Inc., 200 Waterfront St., 115 ft. diam. steel tank, to Chicago Bridge & Iron Wks., 250 Stuart St., Boston, Mass., $15,000; canopy roof, owner builds, $12,000. Noted Aug. 23.

ROAD OIL, etc.—**Iowa**—State Hy. Comm., Ames, to Standard Oil Co., Equitable Bldg., Des Moines, 10,000 gal. AO-1 road oil, f.o.b. West Union, at 7.79c. per gal.***to C. M. Straight, Ames; 18,000 gal. RC-1, f.o.b. Akron, 6.21c. per gal.; 18,000 gal. RC-1, f.o.b. Lucas, 5.75c.***to E. S. Gaynor Lumber Co., 1819 East 3rd St., Sioux City, 4,000 sign posts $2,074. Bids Sept. 10. Noted Sept. 4 Daily.

SNOW FENCE, etc.—**Cherokee, Ia.**—Cherokee Co., 5,000 ft. snow fence, to Wheeler Lumber, Bridge & Supply Co., 606 Hubbell Bldg., Des Moines, $3,675; 5,000 steel posts, to Des Moines Steel Co., 421 Southwest 4th St., Des Moines, $1,323. Est. $5,000. Bids Sept. 10.

†PUMPS—**Fort Leavenworth, Kan.**—U. S. Eng., furnishing, installing well pumps, to H. W. Underhill Constr. Co., 235 North Waco Ave., Wichita, $34,913. Bids Aug. 6.

PIPE, etc.—**Boston, Mass.**—Commonwealth of Massachusetts, Metropolitan Dist. Comm., W. E. Foss, dir. Water Div., cement lined pipe, tar coated pipe and special castings, to Warren Fdry. & Pipe Corp., 75 Federal St., $29,936. Bids Sept. 6, awarded Sept. 8.

†COARSE AGGREGATE—**Montana**—U. S. Eng., Kansas City, Mo., 260,000 tons coarse aggregate and 235,000 tons, f.o.b. Cole, for Fort Peck Tunnels, to J. L. Shieley, 820 Builders Exch. Bldg., St. Paul, Minn. $694,400. Bids Aug. 30. Noted Aug. 23.

PIPE—**Concord, N. H.**—Municipality, waterworks 100 tons 8 in. c.i. pipe, to U. S. Pipe & Fdry Co., Webb-Crawford Bldg., Birmingham, Ala. Est. exceeds $4,000.

WHITE WAY LANTERNS, etc.—**Cleveland, O.**—City, furnishing white way lanterns and standards, to Westinghouse Electric & Mfg. Co., 1216 West 58th St., $2,801***and to General Electric Co., Nela Park, $2,382***6 soot blowers, to Bayer Co., 1504 South Grand St., St. Louis, Mo., $13,258***transformers, to Standard Transformer Co., Cleveland, $13,086. Grand total $31,527.

FOREIGN

Colombia, Bogota—City constructing La Regadera Dam for water supply of Bogota, in Andes Mountains, to Sanders Eng. Corp., Apartado 344, Bogota, and 102 Exchange St., Portland, Me. Est. $2,000,000.

Union Socialist Soviet Republics—Coal Trust, c/o Soviet Government, Moscow, or c/o Amtorg Trading Corp., coal mining and loading facilities for 143 million tons annual capacity at various locations. To exceed $1,000,000.

†*Federal Government*

Foreign (Continued)

Union Socialist Soviet Republics—Commissariat of Heavy Industry, Moscow, or c/o Amtorg Trading Corp., 261 5th Ave., New York, constructing 8,000 ton aluminum plant at Karelian, day labor. To exceed $500,000.

Union Socialist Soviet Republics—Soviet Government, Moscow, or c/o Amtorg Trading Corp., 261 5th Ave., New York, constructing central heating plant for Stalin and Frunze Districts, at Moscow, by day labor. To exceed $3,000,000.

Union Socialist Soviet Republics—Soviet Government, Moscow, or c/o Amtorg Trading Corp., 261 5th Ave., New York, 20 radio stations at various locations, day labor. Maturity during October, November and December. To exceed $500,000.

DETAILS OF PWA NON-FEDERAL ALLOTMENTS

Loans and Grants Except as Noted. *Grant. †Loan.

KEY TO SYMBOLS

- **m**-meters
- **p**-pump
- **t**-tank or standpipe
- **f**-filtration
- **d**-distr. supt.
- **w**-well
- **s**-supply
- **g**-generator
- **ch**-chlorinators
- **c**-canal
- **dm**-dam
- **r**-reservoir
- **t**-treatment plant
- **b**-building
- **i**-iron removal
- **pw**-power line
- **sf**-softening
- **bl**-boilers

Water Works

Beattyville, Ky., **s-p-f-r-t-d**	$54,000
Brewster, Wash., **w-p-r**	5,000
Columbia Falls, Mont., **s-d**	6,500
Dongola, Ill., **w-p-t-d**	40,000
*Enid, Okla., **w-d**	72,500
Jamestown, Tenn., **w-p-t-ch-d**	46,000
Lineville, Ala., **d**	5,000
Mattoon, Ill., **s-tr**	100,000
Middlepoint, Ohio	36,000
*Plattsburgh, N. Y., **s-f**	49,000
Rossville, Ill., **p-m & repairs**	9,500

Sewage Disposal Plants

*Eldorado, Ill.	14,000
*Milford, Mich.	4,500
Topeka, Kan.	273,000

Sewers & Disposal Plants

*Bloom, Ill.	81,000
Massillon, Ohio	592,000

Street or Road Const.

*Clallam County, Wash.	5,700
*Clallam County, Wash.	8,500
*King County, Wash. (paving)	6,500
*King County, Wash. (paving)	8,400
*Kitsap County, Wash. (grading)	1,000
*Madison County, Ill. (paving)	72,700
*Pierce County, Wash. (grading)	7,600
*Pierce County, Wash. (paving)	9,000
*Snohomish County, Wash.	5,900
*State of Washington	9,600
*State of Wash. (bituminous surface)	7,000
*State of Washington (bridge approach)	6,300
*Wahkiakum County, Wash.	2,900

Bridges

*Bolton, Conn. (also 4, 2 mi. rd.)	45,000
*Clallam County, Wash.	6,700
Waterford, Conn. (also 3.85 mi. rd.)	142,000

Buildings

*Austin, Tex. (nurses home)	17,000
Du Page County, Ill. (court house)	751,600
*Findlay, Ohio (library)	19,600
New York, N. Y. (jail)	989,200
*State of Ohio	351,000
Waterloo, Iowa (city hall)	285,000

Schools

Andes, N. Y.	142,500
Big Sandy, Tex.	9,200
*Big Sioux, S. Dak.	4,700
Carson City, Nev.	80,000
*Fordsville, Ky.	10,800
Henry County, Ky.	33,300
*Hobbs, N. Mex.	23,700
*Lake Grove, Ore.	5,500
London Mills, Ill.	50,000
Newport, Ky.	268,400
Parsons, Kan.	100,000
Perley, Minn.	3,500
*Pike County, Ill.	2,800
Safford, Ariz	12,000
San Antonio, Tex.	1,347,000
*Univ. of Tenn., Knoxville, Tenn.	8,000
Winston County, Ala.	96,000

Miscellaneous

Holbrook, Ariz. (heating system, courthouse)	6,000

†*Federal Government.*

PUBLIC BUILDINGS

PROPOSED WORK

Ill., Granite City—See "Waterworks."

Ind., Goshen — City, H. H. Gortner, chn. Building Comm., plans installing new heating plant for nurses home and hospital. $17,900.

Minn., St. Cloud—City, election Oct. 2, to vote on amendment to city charter enabling city to issue revenue bonds constructing municipal electric power and distribution system. $1,294,000. If carried election to vote on bond issue for above project will follow soon. $1,249,000 loan and grant allotted by P.W.A. Burns & McDonnell, 107 West Linwood Blvd., Kansas City, Mo., engrs. Noted Aug. 2.

N. Y., New York—J. Lyons, pres. Bronx Boro. County Bldg., 161st St. and Grand Concourse, bids in fall, constructing jail, 158th St. between River and Gerard Aves. $956,800. P.W.A. project. J. Freedlander, 681 5th Ave., archt.

O., Lakewood—See "Earthwork, Irrigation, Drainage, Waterways."

R. I., Exeter—State, Dr. Frederic J. Farnell, State Public Welfare Comn., plans being completed by J. F. Hogan, 315 Grosvenor Bldg., Providence, for 2 story, 55x65 ft., 55x65 ft. and 35x55 ft., brick, limestone hospital. $125,000.

R. I., Providence—State, H. P. Cross, State House, plans by Jackson, Robertson & Adams, 1216 Turks Head Bldg., 4 story, irregular sized, brick, stone, state office building addition. $160,000. P.W.A. loan granted.

Que., Berthierville—Dominion of Canada, Office Bldg., plans by Richard & Alva, 55 Metcalfe St., Ottawa, Ont., 3 story, stone, brick office building.

BIDS ASKED

†Ala., Birmingham—Sept. 27, by Treas. Dpt. at office Sup. Archt., Wash., D. C., changes in 3rd story U. S. Post Office.

†D. C., Wash—Sept. 24, by Treas. Dpt. at office Sup. Archt., Wash., D. C., altering accounting div. 4th floor Treasury Building.

Ind., Columbia City—Sept. 29, by Comrs. Whitley Co., equipment for heating plant for county building. $12,600. E. Cotterly, aud.

Kan., McPherson—Sept. 25, by City, c/o L. C. Angevine, supt. Municipal Power Plant, brick, concrete light and power plant building and structures. P.W.A. project. Bids of Sept. 5, returned unopened. Burns & McDonnell Eng. Co., 107 West Linwood Blvd., Kansas City, Mo., engrs.

†Mass., Boston—Oct. 5, by Treas. Dpt. at office Sup. Archt., Wash., D. C., elevator plant and mail handling for U. S. Parcel Post building.

Mass., Concord—Sept. 27, by Commonwealth of Massachusetts, M. J. Dee, supt. of Reformatory, removing tower and installing plumbing, electrical work and sprinklers. State P. 17. P.W.A. Docket 4656 at Massachusetts Reformatory at West Concord. To exceed $17,750. Monks & Johnson, 99 Chauncy St., Boston, engrs. Noted July 11.

Mass., South Boston (sta. Boston)—Oct. 3, by W. W. Drummey, supt. constr. at office Dpt. School Buildings, 11 Beacon St., constructing Shurtleff Intermediate School, South Boston Dist. $650,000 up. J. M. Gray, 175 High St., Boston, archts.; adv. E.N.-R. Sept. 20. Noted June 14.

†Minn., Ah Gwah Ching—Oct. 12, by Dpt. Interior, Wash., D. C., 2 story, basement, brick, cut stone, Indian hospital, $250,000. Schmidt, Garden & Erickson, 104 South Michigan Blvd., Chicago, Ill., and Sund & Dunham, 511 Essex Bldg., Minneapolis, assoc. archts. Noted July 19.

N. J., Bordentown—Oct. 2, by Dpt. Institutions & Agencies, State Office Bldg., Trenton, 3 story, basement, dormitories, call buildings, dining hall, power house, sewage disposal plant, water treatment plant, for New Jersey State Prison Farm. $1,000,000. C. N. Leathem, Jr., State Bldg., Trenton, archt. Noted May 31.

N. J., Sparta—Sept. 29, by Bd. Educ., school. $130,000. P.W.A. project. H. A. Kelley, 921 Bergen St., Jersey City, archt. Noted Aug. 16.

N. Y., Cincinnatus—Bd. Educ. bids about Oct. 1, grade and high school. P.W.A. project. R. R. Graham, Middletown, archt. E. E. Seeley & Co., 101 Park Ave., New York, engrs. Noted July 19.

N. Y., Ellenville—Bd. Educ., bids about Oct. 1, general contract 2 story, basement, brick, steel school, Maple Ave. $105,000. P.W.A. project. R. R. Graham, 25 Prospect St., Middletown, archt. E. E. Seeley & Co., 101 Park Ave., New York, engrs. Noted July 26.

N. Y., Haverstraw—Bd. Educ. bids about Nov. 15, general contract school. Knappe & Morris, 192 Lexington Ave., New York, archts. Noted Apr. 26.

†N. Y., New York—Oct. 2, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing elevator plant in U. S. Federal Office Building.

N. Y., Putnam Valley—Bd. Educ. bids about Dec. 1, general contract school. $375,000. Applied for P.W.A. loan. A. F. Gilbert, 358 5th Ave., New York, archt.

N. Y., Wellsville—Sept. 28, by Water & Light Dpt., E. J. Rowe, supt., demolishing present boiler house and constructing new boiler house on same site. G. Esherick, Jr., assoc. engr. Noted Sept. 20.

O., Cincinnati—Oct. 8, by Hamilton Co. Tuberculosis Comn., Hospital Bldg., 1 story, basement, brick, rein.-con. occupational therapy and auditorium building, plain found., Guerley Rd. $175,000. P.W.A. project. H. Hake, 2400 Gilbert Ave., archts.

†Okla., Cushing—Oct. 9, by Treas. Dpt. at office Sup. Archt., Wash., D. C., post office. $53,300. Former bids rejected. Noted Aug. 31, 1933.

Pa., East Brady—Sept. 27, by M. E. Miller, secy. East Brady School Dist., furnishing boilers, stokers, equipment, etc., and construction of new boiler house and heating plant for school district. R. G. Howard, Du Bois, engr.

†Pa., Phila.—Treas. Dpt. at office Sup. Archt., Wash., taking bids miscellaneous mechanical equipment changes in U. S. Mint.

†Tenn., Jackson—Oct. 1, by Treas. Dpt. at office Sup. Archt., Wash., D. C., completing elevator in U. S. Post Office.

†Wash., Fort Lewis—See "Contracts Awarded."

Wis., Columbus—Sept. 26, by Water & Light Comn., H. L. Zeidler, pres., general contract constructing power plant and electrical equipment. C. A. Trimmer, Madison, S. D., consult. engr.

Wis., Shorewood—Oct. 3, by Village School Bd., general contract 2 story basement, 117x193 ft., rein.-con., steel, auditorium, plain found., Capitol Dr. $200,000. P.W.A. project. Herbst & Kuenzli, 1249 North Franklin Rd., Milwaukee, archts. Noted Feb. 15.

CONTRACTS AWARDED

Calif., Los Angeles—Bd. Educ., Chamber of Commerce Bldg., reconstructing, rehabilitating and strengthening shop, home economics and cafeteria buildings, Thomas A. Edison Junior High School, Hooper Ave., to Atlas Constr. Co., 39 Congress St., Pasadena, $40,000***reconstructing, rehabilitating and strengthening Building "B" and constructing new frame building on Russell School site, Firestone Blvd. and Zamora Ave., to G. Mittry, 134 North Avenue 20, $58,000***reconstructing, rehabilitating, strengthening main building at Brentwood School, San Vincente Blvd., to H. Alpert, 225 North Boylston St., $42,500. Grand total $140,500. **P.W.A.** Noted May 10.

Calif., Palo Alto—C. N. Swenson Co., 355 Stockton Ave., San Jose, general contractors, electrical work for school units, to E. F. Burkhart, 444 Emerson St., for Trustees Palo Alto High School Dist. Noted Sept. 6, under "Contracts Awarded."

Calif., Pasadena—Pasadena Bd. Educ., reconstructing school at James A. Garfield Elementary School, to Wm. T. Loesch & Son, 119 East Union St., $150,864. **P.W.A.** Bids Aug. 28.

†Conn., Meriden—Treas. Dpt. at office Sup. Archt., Wash., D. C., installing elevators and extending shaft in post office (now under construction), to Otis Elevator Co., 813 13th St., Wash., D. C., $1,965.

†D. C., Wash.—National Park Service Dpt. Interior, constructing new 7th floor at office building, F and 18th Sts., to McCloskey & Co., Inc., 1620 West Thompson St., Phila., Pa., $417,388. Bids Sept. 5. Noted Aug. 30.

Ga., Atlanta—Fulton Co. Court House, remodeling 4 story, basement, brick, stone jail building, incl. new cell blocks, plumbing, heating, elevators, etc., to Griffin Constr. Co., Spring St., Atlanta, $184,507. **P.W.A.** Bids July 27. Noted July 5.

†Ga., Augusta—Vet. Administration, Arlington Bldg., constructing, installing piping, boilers, etc., in U. S. Hospital, to Hillard Heating & Plumbing Co., 248 Ivy St. N.E., Atlanta, $41,387. Bids Aug. 28. Noted Aug. 16.

†Ill., Grafton—Twenty-First Forestry Dist., Jefferson Barracks, Mo., 1 kitchen and mess hall, 1 bathhouse, 6 barracks, 2 latrines, headquarters building, first-aid building, pump and power house, garage, forestry office and quarters, warehouse at Camp Graham, to James McHugh Sons, 6449 South Park Ave., Chicago, $23,800. Bids Aug. 27.

Ill., Highland—City, one 1,875 k.v.a. generator, station wiring, etc., to Westinghouse Electric Mfg. Co., 411 North 7th St., St. Louis, Mo., $41,570***condenser, to Ingersoll-Rand, Inc., 2701 Olive St., St. Louis, Mo., $14,962***atmospheric tower, to Marley Co., 1731 Walnut St., Kansas City, Mo., $7,687***basin and reconstructing building, to Haldi Lumber & Constr. Co., $2,246 and $6,811 respectively. Grand total $73,276. **P.W.A.** Bids Aug. 30. Noted Aug. 23.

Ill., Macomb—Dpt. P. Wks. & Buildings, Springfield, to Marrs-Tanner Electric Co., 131 North Vermilion St., Donnell, altering electric wiring in main building, $11,650***to L. A. Walton, 406 Thrush Ave., Peoria, completing tool and implement house, $3,954; heating, $928; electrical work, $104***to Continental Steel Corp., Kokomo, Ind., fencing, $3,417. Grand total $20,053. **P.W.A.** Bids Aug. 14.

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Public Buildings (Continued)

Ia., Clarinda—State Bd. Control, Des Moines, installing boiler at State Hospital for Insane, to Murray Iron Wks., Burlington, $20,000.

†Ia., Hampton—Treas. Dpt. at office Sup. Archt., Wash., D. C., brick, terra cotta post office, to Larson Constr. Co., Fort Dodge, $36,000. Bids Aug. 29.

†Ia., Independence—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to Midwest Contg. Co., 752 Builders Exch. Bldg., Minneapolis, Minn., $35,784. Bids Aug. 30. Noted Aug. 9.

†Ia., Osage—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to R. W. Scott, Albert Lee, Minn., $35,846. Bids Aug. 29.

Kan., Olathe—State, 2 story, basement, 77x229 ft. administration building for school for deaf, to Weeks-Moore Constr. Co., 207 Mutual Bldg., Kansas City, Mo., $162,900. R. Coolidge, State House, Topeka, state archt.

Mass., Boston—City, Trustees of Boston City Hospital, J. P. Manning, pres., 818 Harrison Ave., Boston, 9 story, basement, 100x209 ft., brick, steel, cast stone, granite, limestone surgical and operating room, caisson concrete found., incl. plumbing, heating and electrical work, Harrison Ave., to Matthew Cummings Co., 43 Tremont St., Boston, $1,130,974. **P.W.A.** Bids Aug. 22, awarded Sept. 12. Noted Aug. 30.

Mass., Dorchester—Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, constructing smoke flue for power plant, at Boston State Hospital, to International Eng. Wks., Inc., Box 71, Framingham, $4,150. **P.W.A.** Bids Aug. 28, awarded Sept. 7.

Mass., Milton—R. H. Doane, archt., 60 Batterymarch St., Boston, general contract Junior High School, 3 story, basement, 65x210 ft. and 1 story, basement, 69x93 ft., brick, cast stone, concrete found., Edgehill Rd., East Milton, to Martin W. Ryan, Inc., 763 Mass. Ave., Cambridge, for Town of Milton, Building Comn., Town Hall, $245,793. Bids Aug. 31, awarded Sept. 7. Noted Aug. 16.

Mass., Worcester—Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, ventilation for fire protection, at State Hospital, to Park, L. Davis Co., 270 Dorchester Ave., South Boston, $29,192***sprinkler system, to Rockwood Sprinkler Co., 120 Milk St., Boston, $24,887***rewiring, to Quinn Bros., 239 A St., Boston, $87,000. Grand total $141,079. **P.W.A.**

†Minn., Worthington—Treas. Dpt. at office Sup. Archt., Wash., D. C., post office, to Midwest Constr. Co., 752 Builders Exch., Minneapolis, $40,450. Bids Aug. 2. Noted July 19.

N. Y., Elmira—Dpt. Correction, State Office Bldg., Albany, completing sanitary work, to C. C. Grimm, 259 Delaware Ave., Buffalo, $47,000. Noted Aug. 23.

†N. Y., Warsaw—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to Murch Bros., 4111 Lindell Bldg., St. Louis, Mo., $38,200. Bids Aug. 28. Noted Aug. 9.

†O., Sebring—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to P. M. Johnson Constr. Co., Chillicothe, O., $34,473. Bids Aug. 30. Noted Aug. 9.

†O., Uhrichsville—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to P. W. Johnson Constr. Co., Chillicothe, $35,891.

†Okla., Bristow—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to Lecoutour Parsons Constr. Co., 4162 Flora Blvd., St. Louis, Mo., $42,974. Bids Aug. 21. Noted Aug. 9.

†Wash., Fort Lewis—Con. Q.M., completion 18 sets non-commissioned officers quarters, by force account. Bids Aug. 9 rejected.

Wash., Pullman—State, Bd. Regents, general contract 1 story, 60x100 ft. power house and equipment, campus Washington State College, to R. B. Hammond, 1002 Spaulding Bldg., Portland, Ore., $108,279. Awarded Sept. 5. Noted Aug. 23.

†C. Z., Summit—Yards & Docks, Navy Dpt., Wash., D. C., constructing buildings, roads and services at Naval Radio Station, Spec. 7515, to H. B. Nelson Constr. Co., 505 Red Rock Bldg., Atlanta, Ga., $275,889. Bids Aug. 29. Noted Aug. 2.

†Hawaii—Con. Q.M., constructing buildings, roads, services at Naval Radio station at Oahu, Spec. 7525, to E. E. Black Ltd., P. O. Box 3203, Honolulu, $418,000***modification of engine test stand at Naval Fleet Air Base at Pearl Harbor, Spec. 7241, to J. Kumaloe, 2411 South King St., Honolulu, $11,250.

COMMERCIAL BUILDINGS

PROPOSED WORK

Conn., Bridgeport—National Greyhound Lines, Inc., 254 West 51st St., New York, bids after Oct. 1, brick, steel hotel bus terminal building, Fairfield Ave. and Water St. $250,000. Francisco & Jacobus, 511 5th Ave., New York, archts. Motor Ways Hotel Co. subleases to National Greyhound Lines, Inc.

Pa., Lehighton—B.P.O.E. of Lehighton soon lets contract 3 story, basement, brick, steel, rein.-con. lodge hall, plain found., $125,000. J. P. Richter, Commercial Trust Bldg., Phila., archt. Wm. Steele & Sons, Market St. National Bank, Phila., engrs. Noted Apr. 26.

BIDS ASKED

N. Y., Brooklyn—See "Contracts Awarded."

N. Y., Flushing—See "Contracts Awarded."

N. Y., New York—See "Contracts Awarded."

CONTRACTS AWARDED

Conn., Hartford—G. Fox & Co., 970 Main St., ornamental stairs at department store, Main St., to Bradley & Hubbard Mfg. Co., Hanover St., Meriden, $4,700***cork insulation, to Insulation Co., 650 Main St., Hartford***air conditioning, to Carrier Eng. Co., Chrysler Bldg., New York. Noted Jan. 25, under "Contracts Awarded."

Mo., St. Louis—Mississippi Valley Constr. Co., general contractors, Wainwright Bldg., excavating for 3 story, basement, brick, rein.-con. orphanage for St. Joseph's Male Orphan Home, Grand Blvd. and Delor St., to Mills Drayage Co., 2817 Easton Ave.***concrete work, to G. L. Cousins Contg. Co., 841 Rosedale Ave.***brick work and hollow tile, to F. Schmitt Contg. Co., 650 Rosedale Ave.***cut stone, to St. Louis Contg. Co., 4417 Clayton Ave.***iron and steel and iron stairs, to Columbia Iron Wks., 4254 Vista Ave.***millwork, to Peterson Planing Mill Co., 2800 Lyon St.***gypsum roof, to Lathrop Hoge Constr. Co., Cincinnati, O., c/o J. A. Melvin, 859 Goodfellow Ave. Noted Sept. 13, under "Contracts Awarded."

N. Y., Brooklyn—Inas Realty Co., 253 Montgomery St., New York, 6 story, basement, apartment, Avenue O and 23rd St., separate contracts. $150,000. M. E. Ungarleider, 191 Joralemon St., archt. Noted Aug. 23.

N. Y., Brooklyn—Gel Stein, Inc., 1555 55th St., 6 story apartment, Avenue P and 11th St., separate contracts. $140,000. M. N. Weinstein, 93 Court St., archt. Noted Aug. 23.

N. Y., Brooklyn—H. Lefrack, 897 Empire Blvd., group dwellings, Winthrop and 94th Sts., separate contracts. $100,000. Kavy & Kavovitt, 16 Court St., archts. Noted Aug. 30.

N. Y., Flushing—M. Meyerowitz, 26 Court St., Brooklyn, group dwellings, 154th St., separate contracts. $100,000 or more. A. Marjey, 110 West 40th St., New York, archt. Noted Sept. 6.

N. Y., New York—Fort Independence Realty Co., 271 Madison Ave., 6 story apartment, Spuyten Duyvil and 230th St., separate contracts. $250,000. E. J. Kahn, 2 Park Ave., archt. Noted Aug. 30.

N. Y., New York—Society of New York Hospital, 71 Bway., 3 story, 82x238 ft. apartment, 6 West 16th St., separate contracts, $150,000. Bids about Oct. 15. G. G. Miller, 10 West 47th St., archt.

INDUSTRIAL BUILDINGS

PROPOSED WORK

Tex., Houston—WAREHOUSE, etc.—R. J. Cummins, engr., Bankers Mortgage Bldg., soon lets contract 3 story, 60x80 ft., brick, concrete, warehouse, etc., 67x200 ft. train shed and loading platform, for Continental Can Co., 105 North Greenwood St. $125,000.

BIDS ASKED

Colo., Summitville—MILL ELECTRIFICATION WORK—See "Contracts Awarded."

N. Y., Corona—GARAGE—See "Contracts Awarded."

Tenn., Memphis — FACTORY — Plough, Inc., A. Plough, pres., East Parkway and South Parkway, taking bids factory, at intersection of East 6 South Parkway. $350,000. Noted July 19.

Tenn., Cleveland—SERVICE STATION, etc.—G. Johnson taking bids 1 story, service station, gasoline pumps, rest rooms, repair shop, Ocoll St. $40,000. M. Mabry, Rossville, archt. Noted Sept. 13.

Man., Winnipeg—PLANT—Western Vinegars Ltd., 463 Redwood Ave., E. L. Isard, mgr., taking bids 2 story, 70x140 ft., brick, tile vinegar manufacturing plant addition. $60,000. Additional special equipment for manufacture of vinegar to be installed.

Quebec—GOLD MINING DEVELOPMENT—See "Contracts Awarded."

CONTRACTS AWARDED

Calif., Long Beach—PLANT—Santa Cruz Portland Cement Co., Crocker Bldg., San Francisco, G. Cameron, pres. and R. A. Kinzler, ch. engr., 25 ft. diam., 50 ft. high, rein.-con. international mill, warehouse and packing house, to L. E. Dixon, 609 South Grant St., Los Angeles, $78,980. Bids Aug. 31, awarded Sept. 5.

Calif., Los Angeles — BAKING PLANT — Helms Bakeries, 8800 Venice Blvd., plant addition, to Grant & Bruner, 307 South Hill St. Est. $100,000. Noted Aug. 30.

Colo., Summitville — MILL ELECTRIFICATION WORK—Consolidated Mines, Inc., electrication work on ore mill, incl. equipment, separate contracts. Est. $50,000 or more.

Fla., Pensacola—BREWERY—Spearman Brewing Co., L St. and Barrancus Ave., C. A. Fulghum, supt., brewery. Owner builds. $1[illegible]5,000. Richard Griesser & Sons, 54 West Randolph St., Chicago, Ill., archts. and engrs. Noted Sept. 13.

Ind., Anderson—PLANT—Standard Oil Co., Anderson, bulk oil plant, 11 new storage tanks, to T. P. Kelley & Son, Anderson, $50,000.

Ia., Fort Dodge—PACKING PLANT—Tobin Packing Co., general contract 3 story, basement, brick, steel, to W. A. Klinger Constr. Co., Sioux City***refrigeration, to Baker Ice Machine Co., 3601 North 16th St., Omaha, Neb.***electrical work, to Robertson Electric Co., Cedar Rapids***plumbing, to V. J. Haglan Co., 506 Pearl St., Sioux City***insulation, to United Cork Co., Lynwood, N. J. Est. exceeds $300,000. Awarded July 27.

Ia., Waterloo—PACKING PLANT—Rath Packing Co., Elm and Sycamore Sts., furnishing, installing one 536 hp. bent tube type boiler operated by forced draft and chain grate stoker, to Combustion Eng. Co., 208 Clark St., Chicago, Ill.; 210 ft. rein.-con. chimney, to Alphonse Custodius Chimney Co., 95 Nassau St., New York. Stone & Webster Eng. Corp., 90 Broad St., New York, N. Y., engrs.

Me., Portland—SUPER SERVICE STATION—Jenney Mfg. Co., 8 India St., Boston, Mass., W. A. Gott, engr., 1 story, basement, 25x45 ft., brick, concrete super service station, incl. heating, plumbing, electrical work, tanks, pumps, pipe lines, grease pits, etc., to Frankini Constr. Co., 30 Mystic Ave., Medford, Mass. Bids Aug. 30, awarded Sept. 4.

Md., Baltimore—MANUFACTURING PLANT Chieftain Mfg. Co., Clinton and O'Donnell Sts., 3 story, 75x75 ft., addition to manufacturing plant, to Engineering Contg. Co., 504½ St. Paul St. B. Frank, 517 North Charles St., archt.

Md., Curtis Bay—PLANT—U. S. Industrial Alcohol Co., Curtis Bay, general remodeling of plant, removing exterior walls, etc., to Barney Ahlers Corp., 110 West 40th St., New York***concrete footings for 7,200 lin.ft. 12 in. steam line, to C. W. Schmidt, Munsey Bldg., Baltimore***structural steel for same, to Bartlett Hayward Co., 200 Scott St., Baltimore. Noted July 26.

Mass., Falmouth—SUPER SERVICE STATIONS—Jenney Mfg. Co., 8 India St., Boston, W. A. Gott, engr., 1 story, basement, 24x26 ft. brick, concrete super service station, incl. heating, plumbing, electrical work, tanks, pumps, pipe lines, grease pits, etc., Main St., to Frankini Constr. Co., 30 Mystic Ave., Medford. Bids Aug. 30, awarded Sept. 4.

Mich., Detroit—PLANT—American Brakebloc Co., Merritt Ave., plant, Merritt Ave., to Austin Co., 16112 Euclid St., Cleveland, O. To exceed $28,000 with equipment. Noted Aug. 23.

Mo., St. Louis—FACTORY—Carter Carburetor Co., 2838 North Spring Ave., 4 story side and 1 story, top addition, brick, rein.-con., to Fruin-Colnon Contg. Co., 502 Merchants LaClede Bldg. Est. $50,000. Awarded Sept. 7. W. M. Ewart & C. W. Martin, c/o owner, archts.

N. Y., Brooklyn—STORAGE and STORE—Pubnice Realty Corp., 447 Sutter Ave., storage and store, 2nd St. and Brighton Beach Ave., separate contracts. $50,000. J. J. Millman, 191 Joralemon Ave., archt. Noted Aug. 30.

N. Y., Corona—GARAGE, etc.—R. Bartholomew, 6947 Astoria Ave., Long Island City, garage, factory, showrooms, 111th St. and 44th Ave., separate contracts. $35,000. **Maturity late in October.** G. Salerni, 25-18 Newtown Ave., Long Island City, archt. Noted Sept. 6.

N. Y., Flushing—MARKET, etc.—Swift & Co., 32 Tenth Ave., New York, general contract 2 story, basement, 90x135 ft., brick, steel, market and smoke house, Avery Pl. and Lawrence Ave., to John W. Ryan Co., 8 East 41st St., New York. Noted Sept. 6.

O., Cincinnati—PACKING PLANT—Kroger Grocery & Baking Co., 35 East 7th St., general contract 2 story, basement, 150x200 ft. packing plant, to Penker Constr. Co., 1030 Summer St., approximately $250,000.

O., Cleveland—FACTORY—Meriam Co., J. B. Meriam, pres. and mgr., 1955 West 112th St., 1 story, 50x100 ft., all steel portable building, 1955 West 112th St., to Truscon Steel Co., Builders Exchange. Est. $30,000. Private plans.

Wis., Milwaukee—BOILER HOUSE—Miller Brewing Co., 4000 West State St., general contract 1 story, 57x85 ft., brick, steel, boiler house, West State St., to Meredith Bros. Co., 121 East Washington St., $38,000. F. A. Ronkel, c/o owner, engr.

Ont., Cornwall—FACTORY—Canadian Cottons Ltd., Cornwall, constructing addition to factory and boiler house to Anglin-Norcross Corp., Ltd., 892 Sherbrooke St. W., Montreal, Que. Est. $100,000. Noted Aug. 23.

Ont., Toronto — PLANT — Liquid Carbonic Canadian Corp., 41 Mill St., general contract for liquid carbonic gas and dry ice manufacturing plant, Mill and Trinity Sts., to C. Taylor, 42 St. Germain St. Est. about $150,000. Noted Aug. 9.

Quebec—GOLD MINING DEVELOPMENT—Payore Gold Mines, 357 Bay St., Toronto, developing gold mining properties, day labor $125,000 with equipment.

Que., Shawinigan Falls—FACTORY—Canadian Industries Ltd., 1050 Beaver Hall Hill, Montreal, addition to peroxide manufacturing plant, to Fraser-Brace Eng. Co. Ltd., 107 Craig St., Montreal. $100,000. Awarded Sept. 4.

For official proposal advertising see Searchlight Section

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